From Knowledge to Wisdom

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Coping Strategies in Relation with Personality Resources of Resilience and Possibilities of Intervention in Adolescents

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Abstract: The study examined the relationship between coping strategies and personality resources of resilience and presented the results of the research of the effects. Programme aimed at stress resistance enhancing, which was applied in a closed chosen groups of physically handicapped adolescents and adolescents without physical handicap. Within the scope of the programme, during the period of four months and throughout eighteen independent meetings, specific trainings aimed at personality resources enhancing were used with focusing on basic development areas in the groups adolescents (aged 12-15 years). In comparison with the intact group, the physically handicapped adolescents make use of some less acceptable coping strategies. The observed preferences of looking for understanding and emotional support by adolescent girls indicate the influence of gender on the selection of a certain type of coping strategy. After the programme was completed, a retest showed difference in group participants used active, i.e. adaptive types of coping strategies. On the basis of the results, it is recommended to focus on prevention and intervention area besides the research and diagnostic area.

Key words: Physical disabilities, early adolescence, prevention of stress, personality factors, coping strategies.

1. Introduction

The project builds on an interest in mental health and healthy lifestyle, particularly the problems of coping with the burden and stress among young people and influence on their mental resilience, strengthening personal resources. The project is an experimental verification of the increasing resistance to the negative impact of stress on health of adolescents in the group. The part is to measure the quality of processes and the specifics in the coping strategies which are the basis for setting specific goals and methods of construction of such a programme. In particular, the study focus on the training practices in the prevention and the intensive development of personal resources, especially during adolescence, and specifically for the disabled, who are in a critical developmental stage.

Boys and girls aged between 12 years and 15 years are early adolescents [1]. Early adolescence is a particular period of rapid cognitive, social, emotional and physical changes [2]. These changes have a great impact on the health of adolescents. For example, those in early adolescence become physically mature and experience changes in school [3, 4]. During this period, early adolescents usually lack the ability to cope when they experience stress, which is usually family and school-related [5]. If they cannot cope with such stress, they may fail to develop in a healthy manner and may develop habits harmful to their health.

To enhance positive behaviour in those in early adolescence coping with stress, a school project was implemented using focus group interviews, an open forum and follow-up interviews and journals. The objectives were to identify the stressors encountered by

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the students and their ability to cope, to develop and implement an educational activity to promote positive coping behaviour and to evaluate the effectiveness of the educational activity. The findings of the evaluation support the view that an early prevention programme for promoting positive coping behaviour to early adolescents is useful.

In puberty, disability is integrated into its own identity. It is clear that disability is the process more difficult and the risk of failure is greater. These problems may not be directly proportional to the extent of somatic damage [6]. In his treatment the important role is played by subjective evaluation of physical limitations, the acceptance of his own disability, the ability to cope with difficult circumstances, acceptance of disability as well as family, society [7]. These reactions are largely conditional on the individual personality structure with which the disabled interact with the external environment [8, 9]. Therefore, it is necessary to try to establish scientific study on the basis of already existing approaches and the results obtained for the study of research and coping in adolescent development, specifically in adolescents chronically ill and physically disabled. In the present study, it is important to further scientific study of these processes, as well as develop and verify the effectiveness of programmes for disabled adolescents, which is already referred to the physical weakening of the specific source of burden and strengthening the resources required special management [10].

1.1 Objectives of the Project

Promoting positive styles of coping in early adolescence is therefore a major concern as in most other countries. With respect to this concern, the researchers designed a school-based project with the aim of promoting positive coping behaviour in early adolescents. The project was called "Programme to Increase Resistance to Stress of Early Adolescents" and was piloted in a school located in Bratislava. Focus group interviews the students to identify the stressors that they students have experienced and their styles of coping. An open forum was used to promote positive coping behaviour.

Interviews with parents and the use of reflective journals with the students were used to evaluate the effectiveness of the open forum. This article reports the details of the project and the findings of the project evaluation that made part of wider research on the coping strategies in relation to the personal sources of resistance and possibilities for intervention action is to measure the quality of processes and the specifics of managing load (coping strategies).

The project assesses the value intervention programme on the basis of empirical records i.e. evaluation of the intervention programme using empirical data test-retest method. The general objectives of the project were as follows:

(1) To identity the stressors for the early adolescents and their coping with the stressors:

- Examine the preference of coping strategies and adaptability stress in the disabled and healthy adolescents;
- To deepen understanding of potential of a link between preferred coping strategies with personal characteristics (the interaction approach).

(2) To plan and implement an educational activity to enhance the positive behaviour of the adolescents, to evaluate the effectiveness of the educational activity:

- Psychologically guide risk coping strategies and development of their personality by increasing resistance to stress—by strengthening personal resources;
- Confirm authenticity, effectiveness of the comprehensive application of psycho-educational programme for increasing resistance to stress in preventing the negative effects of load, specifically in adolescents with disabilities and support their successful integration in the majority-society.

2. Methods and Materials

Each of the phases of the project was designed to achieve the objectives respectively. The phases were:

(1) assessment of adolescent stressors and their coping strategies; (2) open forum; (3) project planning, implementation, and project evaluation.

The first phase was considered important, so that a tailor-made activity for the students could be developed. The second phase was developed according to the findings of the first phase. The last phase was programme implementation and evaluation. Programme evaluation is "the use of research procedures to systematically investigate the effectiveness of social intervention programmes" [11]. Semi-structured interviews, test-retest and student reflective journals were used to evaluate the effectiveness of the educational activity.

The file is obtained with the consent of the directors of specialized equipment for disabled and medically fragile youth, schools and the current type (control sample). The project brings the results in the group of 620 respondents (234 adolescents with physical disabilities and 386 adolescent students of 2nd grade school, without the attendant disability). Of a group of 234 disabled, there are 123 boys (average age 13.47 years, *S.D.* = 1.48) and 111 girls (average age 13.68 years, *S.D.* = 1.31); of a group of 386 students without a disability, there are 169 boys (average age 12.77, *S.D.* = 1.44) and 217 girls (average age 12.82, *S.D.* = 1.36).

A comprehensive psycho-educational programme to increase resistance to stress was made in a closed group of adolescents with disabilities together with the control group on the basis of obtaining informed consent of parents or legal representatives of the participating subjects in research. With the help of the headmaster, a notice about the project was sent to the parents. It was stated in the notice that 16 students and their parents would be invited to participate in the project.

A meeting between the students, parents and researchers was held to discuss the purposes and logistics of the project as well as issues such as confidentiality, anonymity and the rights of participants to consent, decline or withdraw. This was supported by statements in the consent form. The parents and the students agreed to participate and the parents signed the consent forms, the student sample consisted of 9 boys (of them, three aged 15 years, two aged 12 years and four boys were aged 13 years) and 7 girls (two aged 15 years, three aged 13 years and two girls were aged 12 years) with disabilities (diagnosis: spina bifida, cerebral palsy, juvenile rheumatoid arthritis, and spinal cord injury) placed in homes of social services for disabled youth; 13 adolescents without physical handicap (average age 13.47 years). The parent sample consisted of 14 mothers and two fathers. Students participated in all phases of the project. Sixteen parents participated in the third phase.

To capture more aspects of coping, scales for assessing coping strategies were used (in terms of disposal and situation coping): CI (Coping Inventory, [12]); CCSC (Children's coping strategies checklist, [13]); assessment of personality factors: CCQ-BFS (The California Child Q-set big five scales [14]); programme to increase resistance to stress—"ZOS" (Table 1), behavioural assessment scale for teachers, parents (numerical rating scale assessment), interview, group discussion, systematic, long-term observation (repeated meetings), analysis of documents (training scheme, developed by sheets, and diaries). Exercises are applied consistently in support of personal resources in the areas of resistance (the modules). Each module consists of workshops dealing with various categories of skills. Practical modules package is intended for a group of people, even when the content can be adapted to the individual personality.

The programme was conducted out exercises to promote group cohesion and "breaking ice" on the initial meeting + strengthening activities to the individual needs of the programme. All exercises and activities in the programme are arranged flexibly in relation to the survival and behaviour of participants in the group. The main task of the intervention programme is to increase the competence of the individual participant in order to be able to use their options in dealing with stress situations.

Table 1 Characteristics of the intervention programme.

Programme to increase resistance to stress of early adolescents—"ZOS"	
Theoretical background	1. Programme ZOS based on the "Living Skills Pack" [15] and on the project "Resiliency" Grotberg and Masten, obtained in collaboration with the University of Brighton; 2. The programme is based on the theoretical concept of transactional model of stress, the interaction approach to the coping; 3. It relies on humanistic, cognitive-behavioural models of positive psychology, as well as knowledge of the possibilities of strengthening and enhancing the personal sources of resistance to stress and burden of educational and psychological operations.
Application	1. The ZOS is structured type and it is based on personal experience and is linked to theoretical knowledge based on the transactional model of stress and the interaction approach; 2. This takes place with the frequency of meetings: 1 × 90 min/week, 36 meetings, and 9 months.
Programme structure (modules)	1. "Caring for Yourself Unit" workshop (4), 7 h (Self, self-awareness, increasing confidence in their own strength, awareness of their own values); 2. "Assertion and Fighting Unit", workshop (5), 12 h (Strengthening of assertiveness techniques, handle anger constructively, of anger and hostility affect, interpersonal communication, active listening techniques); 3. "Rational Thinking Unit", workshop (7), 10 h (Awareness of the relationship and differences between emotions, thinking and judgments, irrational beliefs, awareness of the negative thoughts, techniques to cope with irrational beliefs and techniques to mitigate the effects); 4. "Relationships Unit", workshop (5), 8 h (Maintenance and consolidation of relations, skills in listening to another, effective communication, conflict resolution); 5. "Stress Management Unit", workshop (5), 10 h (Identification, characteristics reactions, training of practical ways to focus on the problem, define, formulate the problem, develop alternative solutions); 6. "Planning and Organizing Unit", workshop (5), 8 h (Setting goals, search for realistic personal goals, techniques of effective organization of time, motivation in achieving the objective, the scheme of decision-making).

3. Results and Analysis

3.1 The First Phase: Assessment of Stressors and Coping Behaviour

Data from the individual scales were subjected to analysis, descriptive and inferential statistics in the statistical programme SPSS version 18.0 for Windows. Student *t*-test or Mann-Whitney U-test (in cases where the criterion of normality and non-HS) was used to detect differences and differences between the compared groups in terms of the individual pursued by the presence or absence of disability. In the context of the findings of personality factors, coping strategies and adaptive stress management used Pearson correlation coefficient, which is calculated using covariance and the overall deviations of both variables.

The adaptive stress *t*-test and U-test showed a higher productivity, activity focused on themselves and flexibility-oriented to change the environment disabled (Table 2).

The healthy adolescents showed more activity focused on the surroundings. Higher productivity and activity, which are aimed at themselves for the disabled, are likely to show their experience to cope with their disabilities; and greater flexibility for the conversion of the surroundings may occur also in handling the requirements, which puts them on the environment. Focusing on themselves is likely to emerge from the experience to cope with their disabilities, be able to defend themselves against the effects of environment and pressure, to express their needs and ask for help. Greater flexibility, flexibility for the conversion of the surroundings, is a manifestation of adaptation to the environment to the requirements, but also their effort to change the threatening conditions. Overall, the disabled in the adaptation for the conversion of yourself and adolescents without disabilities are targeting to change the surroundings. Group of adolescents with disabilities, rather than the inability to address the situation (they have more experience with the stressors), therefore, they elect emotional coping in an attempt to influence their own negative emotional state.

In the group of boys with disabilities are demonstrated factors as friendliness, conscientiousness, and openness as the strongest predictors of active coping.

Table 2 Adaptive stress in the healthy and disabled adolescents.

	Mann-Whitney U	Wilcoxon W	Z	Sig. (2-tailed)
Productivity-themselves	16,580.5	49,476.5	-2.696	0.007
Activity-themselves	16,986.0	49,882.0	-2.349	0.019
Flexibility-themselves	18,476.5	51,372.5	-1.065	0.287
Activity-environment	14,611.5	26,546.5	-4.395	0.000
Flexibility-environment	16,895.0	49,791.0	-2.427	0.015
	AM	*S.D.*	*t*	Sig. (2-tailed)
Productivity-environment	42,7136	7.08429	-0.546	0.585

Results of correlations can be summarized in terms of coping with adaptive stress aimed at themselves or the surroundings with extraversion, agreeableness and openness, conscientiousness. Neuroticism positively correlated with productivity, focused on efforts to influence their own negative emotional state. Predictors of active coping with stress for a group of girls with disabilities to show factors are as follows: agreeableness, conscientiousness and openness. But the agreeableness and conscientiousness proved significant relationship is cognitive avoidance, which is statistically significance in relation to neuroticism. In adaptive stress management for girls with disabilities, it is a significant relationship between adaptive stress focused on the change affect own emotional state with extraversion, agreeableness, openness and conscientiousness.

The method selected and used in this phase was the focus group interview in group adolescents. It was chosen because other researchers have reported that compatible groups experience less anxiety and greater satisfaction than individual adolescents attending a scheduled interview [16]. Taking into account the students' cognitive and emotional developmental state, six simple questions addressing their perceived stressors and ability to cope were formulated: (1) What do you know about adolescence? (2) At the moment, have you experienced any stress that you have not experiences before? (3) If yes, what was the stress? (4) How would you deal with such stress? (5) How do you feel about your relationship with your parents? (6) How do you feel about your relationship with your teachers or peers? The focus group lasted approximately 45 min.

(1) Analysis of the focus groups. Consent was obtained from the students and their parents to record the focus group discussion. The data obtained from the audiotape focus group interviews would be destroyed after reporting the findings of the project (this was stated in the consent form before the interviews were conducted). The purpose of recording the focus was to help the project team to develop the second phase of the project. The focus group data were transcribed verbatim for analysis. Expressions such as "ums" or "ers" were omitted from the transcript because the data would undergo content analysis at the manifest level [17]. Brockopp [17] suggested that content analysis at the manifest level is simply a direct transcription of the response of the subjects with no assumptions being made about the responses. This is of particular relevance to the analysis of the transcripts here because the students' responses were quite straightforward. Some relevant quotes were selected to illustrate the findings from the students' responses. Regarding changes in adolescence, the students were able to explain the biological changes that take place in males and females.

(2) Perception of stress. This category was divided into two sub-categories: school-related stress and family-related stress. Intriguingly, the possible factor inducing the two types of stress was the same, namely academic performance.

(3) Strategies for coping. Two sub-categories were derived from this category: positive coping and negative coping.

(4) Parent-child relationship. This category was

divided into two sub-categories: expectations of parents and conflict with parents.

(5) Relations with others. Teacher-student relationships and peer relationships were derived from this category.

Having analyzed the responses obtained from the students, the researcher designed the content of the second phase. It can be seen that these students were able to explain the biological changes of adolescence but not other changes such as social and emotional ones. Academic performance appeared to be the major source of stress for them. Although some students said that they would speak to parents, teachers or friends about their problems, other students found it difficult to discuss their problems with their parents. Thus, the researcher determined to use the open forum as the form of activity because it was hoped that the students and their parents could participate in a relaxed atmosphere. Undoubtedly, parents are a significant source of support for their children in relation to coping with stress and their participation in the forum was important. The period between the implementation of the first phase and second phase was one week.

3.2 The Second Phase: Open Forum

At the beginning of the session, the researchers presented the findings of the first phase to the students and parents. The students' anonymity was assured. This allowed the parents to gain a better understanding of the stress experienced by their children and their ability to cope with it. To enable the students and their parents to understand the changes brought about by adolescence and positive coping behaviour in response to such stress, the researchers designed a presentation that was delivered in the second phase. The content of the presentation was assessed by an experienced child health nurse and was considered to be appropriate. The presentation included: biological, cognitive, social and emotional changes in adolescence; the types of stress experienced by adolescents; the types of coping behaviours; and the parenting role in facilitating the healthy growth and development of adolescents, such as offering warmth, care and encouragement.

The students and their parents were invited to discuss the content presented by the researcher in the form of an open forum. To encourage the students to speak freely with the presence of their parents, the researcher extended their appreciation to those young people, reinforcing that their views were valuable and would be taken into consideration by all responsible parties. The parents were encouraged to support this claim and they all agreed. Active participation of the students and parents was demonstrated in the forum. Two approaches were employed to evaluate the effectiveness of the open forum: a focus group interview with parents and a journal exercise for the students. The students were asked to write a journal of 250-300 words on the topic "How to cope with stress?".

Feedback from the Parents: The parents participated in the focus group, which lasted approximately 45 min. The meeting focused on three key questions: (1) How do you feel about the open forum? (2) What do you think about the stress experienced by your children? (3) How would you help your children when they experience stress?

The method of data analysis was the same as that used in analyzing the students' transcripts. Some relevant quotes were selected to illustrate the findings on the responses of the parents. Concerning the open forum, the overall view of the parents was very positive. They expressed that this sort of activity as very useful and benefited them regarding their children.

(1) A child's experience of stress. This category was divided into two sub-categories: study workload and parent-child conflict. The parents stated that their children experienced stress in relation to the study workload. Parent-child conflicts were another source of stress experienced by the children.

(2) Parental coping strategies. In order to help their children cope with stress, the parents agreed with the strategies discussed in the open forum, this category

was divided into two sub-categories: open-communication and parental role. To evaluate the students' feedback on the open forum, a reflective journal was used.

This strategy was used to ensure that every student provided feedback. The researchers reviewed the journals and used content analysis to examine the feedback. Five main categories were formulated by the researcher after reviewing the journals over several rounds. These categories were assessed by a judge who agreed with the categorization after reviewing the content of the journals: (1) Positive thinking; (2) Increase in self-esteem; (3) Relaxation techniques; (4) Seeking assistance; and (5) Tackling academic tasks.

The aim was to verify the effectiveness of the programme to increase resistance to stress, in order to promote the successful integration of adolescents with disabilities into society (third phase).

3.3 The Third Phase: Implementation of the Programme and Project Evaluation

Implementation of psycho-educational programme among the adolescents was carried out from September in room facilities for disabled youth. Preliminary testing of the questionnaire CI, CCSC, CQ-BFS, interviews with students, teachers, educators and psychologists in addition revealed a relatively low preference for adaptive and active coping strategies, as well as expressions of personal dynamics.

Test methods were applied during the project before the programme and one month after completion of the programme (test, retest). Effectiveness of a programme was established test-retest method. Monitoring the effectiveness of the programme was also the subjective assessment of the participants.

The results of a systematic observation retest proved that (Table 3), the programme could reduce the use of passive coping strategies, increase the use of constructive problem-solving, raise a openness to rapprochement with the people, reduce the use of passive withdrawal from the problems, reduce conflict for survival and acceptance limits of disability, and increase self improvement and the total active approach to the requirements of the surrounding area.

There has been a gain of active coping strategies, learning new ways of behaviour in stressful situations, rational behaviour and prudent practices before deciding and reviewing the situation, understanding the emotional experience and expression, self and others, constructive procedures for dealing with interpersonal conflicts.

The results are confirmed with the stakeholders, that the period of adolescence is the establishment of formal operations—seeking alternative solutions to problems reflect themselves as a person's own thinking—there is a feeling suggestibility normal life events and the frequency and cost-effective and active strategies. It appears that personality variables as significant moderators allow coping despite adverse living conditions and ill health experience emotional well-being, which affects the overall quality of life of individuals with disabilities.

4. Discussion

The object of the study was to detect coping behaviour—quality processes and the specifics of the burden in managing adolescents with disabilities. The results revealed that the adaptive stress to change themselves (influence of adverse emotional states) for a group of disabled and adaptive stress management focused on the environment for the conversion of (threatening conditions) for a group of healthy adolescents.

Strongest predictors of coping with stress are shown in all groups compared conscientiousness, agreeableness and neuroticism. Neuroticism proved to be a predictor of passive, emotion-oriented coping on. While the precision and smoothness as a predictor of active, focused on the problem of coping.

Strongest indicator of adaptive coping with stress, focusing on themselves and the environment is conscientiousness and openness to experience. The

Table 3 Results of applications programme for some individual cases.

	Results of applications for improving on resistance to stress	
	Before the application (test)	After the application (retest)
I	1. Problems with benefits and inclusion in the team class, conflicts with classmates and siblings; passive distance from the problems, excessive physical aggression, helplessness in dealing with frustrating situations; 2. Frequent use of passive coping strategies, namely: distracting activities, cognitive avoidance, avoiding problems with friends and at school; inadequate internalization of negative emotions; enhanced neuroticism.	1. Outflow of passive and evasive coping strategies (distracting activities, dissociation from the problems in school and conflicts with friends, internalization of negative emotions); 2. Increment approach and active coping strategies (cognitive decision making, positive review of a conflict situation; search social support, direct address school and friends).
	Overall reduction strategies passive coping Frequent use of coping strategies as a constructive solution problem	
M	1. Passivity in dealing with conflict, frustration, social isolation, escape from reality, survival of the lack of intimacy; weakness in conflict situations, lack of new social relationships often conflicts with his mother, uncertainty, gloom; 2. Most frequently used physical release of emotions, escape activities, cognitive avoidance; negative internalize emotions in conflicts with their friends; neuroticism high, closed to the surroundings.	1. Outflow of passive and evasive coping strategies (physical release of emotions, escape and distracting activity, away from passive problems with their friends and parents); 2. Increment approach and active coping strategies (cognitive decision making, positive review conflict situation; search of social and emotional support in a dispute with parents, a direct solution to problems with friends and parents).
	Change from passive to active coping and adaptive strategy, openness to rapprochement with people Far be it from reduced passive problem	
A	1. Conflicts with classmates, the fear of stamps and disappointing close; escape into fantasy; inadequate sublimation; excessive aspirations, problems with anger control in school activities; 2. Use of escape; cognitive avoidance, passive withdrawal from the problems in school, high internalization of negative emotions in relation to parents, excessive conscientiousness; extraversion, neuroticism.	1. Outflow of passive and evasive coping strategies (escape and distracting activities, cognitive avoidance, dissociation from the conflict with his classmates; reduce externalizing negative emotions in school and in dispute with friends); 2. Increment approach and active coping strategies (direct solution of the problem in school and friends; search of emotional and social support with problems in school and conflicts with friends).
	Increase in active strategies coping, reduction conflicting survival handicap	
R	1. Uneven track with parents, conflicts with his father; inappropriate fixation on subjective significant person; unrealistic ideas about solving the current conflict; frequent resignations; unwarranted self, low expectations, expressions of passivity, helplessness, apathy, unwillingness to admit a mistake; 2. Distracting use and escape activities; passive distance from the conflict resolution with friends and parents, increased internalization of negative emotions in the school; neuroticism high, extraversion.	1. Outflow of passive and evasive coping strategies (escape and distracting activities, avoidance of conflict with parents and friends; internalization of negative emotions in the school); 2. Increment active and approach coping strategies (positive reassessment of the situation, cognitive decision making, direct solution of problems in a dispute with parents friends, search for understanding and support in the conflict with parents).
	Significant addition in the use of active coping strategies, use constructive way to solve interpersonal conflict	
P	1. Shrinking in favour of school and lack of redress; fictive (hyper) compensation disability; escape from reality, lack of confidence, verbal aggression; 2. Frequent use of evasive and distracting strategies, away from passive solutions to problems and conflicts in school, a direct solution to problems with parents (reserve); increased internalization of negative emotions in the school; neuroticism, extraversion/shining.	1. Outflow of passive and evasive coping strategies (cognitive avoidance, escape and distracting activity, away from passive problems in school; internalization and externalization of negative emotions in relation to the school); 2. Increment approach and active coping strategies (direct address problems in school and conflicts with friends; cognitive decisions; search social support in school and in dispute with friends).
	Improving self-improvement, self-evaluation, proactive approach to life	
J	1. Excessive generalized; escape from reality, low self-assessment; feeling of inferiority, lack of confidence, misuse of disability to the handling of persons; frustrating low tolerance; 2. The use of cognitive avoidance, escape activities; internalization of negative emotions in relation to school and friends, directly addressing the problems and conflicts; search social support among parents (reserve); increased neuroticism, friendliness.	1. Outflow of passive and evasive coping strategies (escape and distracting activities, cognitive avoidance, internalization of negative emotions in school and in relation to friends, passive distance from the problems in school and conflict with friends); 2. Increment approach and active coping strategies (direct address school, with friends, search for social support in conflict with parents and friends).

interim results of a broader research shows a need to support the development of personality characteristics, which are predictors of adaptive and active coping in healthy and adolescents with disabilities [4].

The results of an abbreviated version of an application to increase resistance to stress appears to be psycho-educational programme as some means of preventing psychosocial problems of disabled adolescents, particularly in support of adaptive strategies for coping with the burden and stress, which is confirmed by other research studies [2, 8, 10].

5. Conclusions

On the basis of the results and practical needs, it is recommended to focus on prevention and intervention area in adolescents with disabilities.

The interim results show the needs: (1) Repeat testing of changes over a longer time after application of the programme; (2) Ensure continuity and prevent the consolidation of the observed deficiencies in socializing and personal development in a critical developmental stage; (3) Publish the universal guide of preventive psycho-educational programmes to increase resistance to stress for the disabled and physically weakened; (4) Develop a practical procedure for the integration of parts of the verification programme to the educational process for the general population of youth; (5) Focus further investigation and the relationship between coping and resistance by finding the proportion of different groups of resiliency factors on the overall picture of resistance.

However, because of constraints on time and human resources as well as the method employed, the present project was piloted in a school with a limited number of participants. It is hoped that a larger scale project with sufficient resources, based on the findings of this project, will be implemented in the future. This will help to improve the generalization of the present project and further support the usefulness of early prevention programmes for the promotion of child and adolescent health.

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The Adult Attachment Interview in the Study of the Intergenerational Transmission of the Trauma of the Shoà

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Abstract: The question of the existence of long-term psychological effects of the Holocaust on the survivors and their offspring still keeps the scientific and clinical literature divided. Whereas clinically based reports on offspring of Holocaust survivors pointed to intergenerational transmission of traumatic experiences, more controlled studies did not find much psychopathology, except when second generation subjects were confronted with life-threatening situations. Recently, a number of studies have used attachment theory as a conceptual framework for exploring the intergenerational effects of traumatic experiences. The purpose of this study is to understand the way in which the process of trauma transmission can be investigated from an attachment perspective. The hypothesis is that the intergenerational transmission of the "shadow" of the Holocaust has weighed on the "second generation", through the mechanism of "frightening/frightened" responses given by the parent. Participants to the study, 26 Jewish Italian offspring of Concentration Camps survivors and 26 Jewish Italian offspring of Jewish parents who did not experience the Concentration Camps, were interviewed with the AAI (Adult Attachment Interview) in order to detect thought processes indicative of unresolved traumatic experiences. The distribution of the main classifications for the AAI for both the EG (experimental group) and the comparison groups did not show a significant difference between the two groups. Moreover the EG is not strongly "traumatized". These results are in-line with others similar researches. The data suggests that the presence of mediating factors may mitigate the trans-generational impact of trauma.

Key words: Attachment theory, trauma of Holocaust, trans-generational transmission, adult attachment interview.

1. Introduction

The question of the existence of long-term psychological effects of the Holocaust on the survivors and their offspring still keeps the scientific and clinical literature divided. Studies on the psychological consequences of the Holocaust for the first generation, the survivors, do not show unequivocal outcomes. Some researchers demonstrated that most Holocaust survivors were able to establish a productive and successful existence, as well as a happy family life [1, 2]. In their view, Holocaust survivors did not seem to be seriously hampered by psychological problems [3-5]. Other researchers reported profound disturbances such as chronic anxieties and depression, and discordant family functioning [6, 7]. In particular, clinically oriented researchers reported many psychological disturbances in Holocaust survivors, but they sometimes rely on impressionistic case-studies or selected samples of survivors who had asked for psychotherapy or were involved in treatment. Considering systematic empirical researches the picture becomes less clear [8, 9], probably because the instruments utilized were not sufficiently sensitive for detecting the more subtle psychological effects.

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There is growing evidence from non-Holocaust related research on traumatic stress suggesting that normal people may cope rather well even after extreme stress but that they may be more vulnerable to future adversity [10-13]. For example, in a number of war-related studies in Israel [14], it was discovered that even people who have apparently overcome traumatic experiences might become more vulnerable to crises in the future. Moreover, it has been found that under extreme circumstances they might even show acute stress responses, particularly when exposed to stimuli that symbolize the original traumatic experience [15]. Replications of similar findings can be seen with Vietnam veterans [16, 17], Korean veterans [18], and prisoners who were kept by the Japanese army during the Second World War [17]. Similarly, elderly Holocaust survivors were found to suffer considerable emotional distress during the Persian Gulf War [19].

The inter-generational transmission of traumatic experiences associated with the Holocaust has been the focus of many studies [20] and, apparently, the findings of clinical reports on children of Holocaust survivors are tendentially less consistent as compared with more systematic research paradigms.

Whereas clinically based reports on offspring of Holocaust survivors point to intergenerational transmission of traumatic experiences [21], more controlled studies did not find much psychopathology [22], except when second generation subjects were confronted with life-threatening situations [22-24].

From the perspective of attachment theory [25], a number of studies have recently focused on the effects of loss on the individual's state of mind (i.e. mental representations) with regard to attachment. In particular, unresolved loss and trauma in parents have been related to their attachment relationships with their infants, which have been more frequently characterized by disorganization [26-28]. More specifically, several studies have shown the effects of unresolved loss and trauma on parental behavior and the resulting issues in terms of child-parents attachment relationships [29].

The main focus of attachment theory is on the making and breaking of relationships and as such it contains descriptions and explanations of the effects of affective bonds between children and their caregivers, and of the separation or loss of attachment figures [30, 31]. According to attachment theory, a primary function of attachment relationships is to serve as a source of security for the infant in situations that induce fear or anxiety in the child.

The concept explains the process by which infants establish secure or insecure relationships with their primary care providers. It is assumed that children develop an internal working model of their affective bonds during the first four years of life, that is, they construct a mental representation of socio-emotional aspects of the world, of others, of the self and of the relationships to others who are special to the individual [31, 32].

In a meta-analysis of the first 18 studies with the new assessment for adult attachment (the AAI) [33], involving a total of 854 families, van IJzendoorn [29] found that in about 75% of the cases, infant attachment security/insecurity with the parent was predicted on the basis of the security/insecurity of the parents' current mental representations of their childhood attachment experiences [34]. That is, parents with an insecure view of their childhood attachment experiences—even before the birth of their child [35-38]—appeared to build an anxious attachment relationship with their infant, as measured through the Strange Situation Procedure, a standard observation instrument for assessing the security of attachment relationships for 1 to 2-year-old [30].

In addition, the parents' attachment security has been found to be predictive of behaviour towards the children [38-40]. For instance, securely attached mothers, compared with insecure mothers, appeared to show more warmth and supportiveness during a challenging activity and to provide clearer and more helpful assistance which encouraged learning and mastery in their children [29]. At the same time,

insecure mothers—in particular those who are still preoccupied with their own attachment experiences—appear to switch between overprotecting their children and inviting "role reversal" and "parentification" on the part of their children. Many parents seem to repeat their childhood attachment experiences in relating to their own children, thus stimulating the transmission of (secure and insecure) attachment across generations.

In much literature, Holocaust survivors have been described as inadequate parents. Their multiple losses were assumed to create childrearing problems around both attachment and detachment. For example, overt messages conveyed by Holocaust survivor parents, such as "Be careful" and "Don't trust anybody!" were assumed to have left their indelible marks. The exaggerated worries of such anxious parents may have conveyed a sense of an incumbent danger that the child may have absorbed.

For these reasons, in the present research attachment theory was chosen as the conceptual framework for exploring the potential long-term, inter-generational effects of the trauma of Holocaust.

2. Materials and Methods

The purpose of this study is to understand the way in which the process of trauma transmission can be investigated from the attachment perspective.

The starting hypothesis is the existence of a pattern through which unresolved bereavement and grief experienced by the parents who survived the Holocaust (in particular, persons who had experienced concentration camps were selected for the study) can affect the interactions with the second generation and, also, make their pathways for personal identity more difficult. In particular, the hypothesis of the work is that the intergenerational transmission of the "shadow" of the Holocaust [41] has weighed on the "second generation" of survivors, through the mechanism of "frightening/frightened" responses given by the traumatized parents.

The participants were 26 Jewish Italian offspring of Concentration Camps survivors (mean age: 41.4 years) and 26 Jewish Italian offspring of Jewish parents who did not experience the Concentration Camps (mean age: 49.9 years) participated in the study. The select sample of the Jewish "second generation" were recruited in the association "I figli della Shoà". The participants of the comparison group were matched to those of the selected sample on age, education and sex. All subjects were born after 1945 and so they did not have direct experience of Nazi persecutions.

All participants were interviewed with AAI [42] in order to detect thought processes indicative of unresolved traumatic experiences [43, 44]. The AAI protocols were independently codified by two researchers, the co-authors of the present paper, who, after successfully completing both the official Adult Attachment Training Institute Course—held in Rome with professors Nino Dazzi and Deborah Jacobvitz—and the interrater reliability test, were certified by them to code the AAI. Intercoder reliability for the AAI using a four-way classification system (F, Ds, E, U) reached an agreement of 85% (Kappa = 0.76) [45].

3. Results and Analysis

The distribution of the main classifications for the AAI for both the experimental and the comparison groups is: secure-autonomous = 12 (46.2%) *vs.* 15 (57.7%); insecure-dismissing = 12 (46.2%) *vs.* 5 (19.2%); insecure-preoccupied = 2 (7.7%) *vs.* 6 (23%); insecure-unresolved = 4 (15.4%) *vs.* 1 (3.8%).

The study did not find a significant difference of attachment style between the second-generation Holocaust survivors and their comparisons (c^2 (2, N = 52) = 5.216, P = 0.074), in accordance with other works.

Such results suggests that the intergenerational transmission of the "shadow" of the Holocaust is not an automatic process; indeed, it is a complex process which involves many "mitigating" factors, related to

personal resolution or mentalization capacity, that are assumed to decrease or increase the development of specific second-generation psychopathology.

More specifically, there are a number of variables that helped many survivors to reintegrate back into the civil and social environment, and to raise and take care of their children in a sufficiently adaptive way. Therefore, it is not trauma itself the factor determining the survivor's disorganized state of mind, but rather the possibility of elaborating it.

Regardless of the attachment styles, Holocaust survivors' children were more often classified as dismissing than the comparisons. More specifically, these (dismissing) subjects felt less uncomfortable without close relationships; they emphasized the importance of being self-reliant and of not being dependent upon others. It is suggested that the traumatic experiences experienced by their parents might have stimulated them to adopt the dismissing attachment style as a defensive strategy, in order to protect their children.

Moreover the experimental group is not strongly "traumatized". While it does not appear to be a statistically normative group; yet, it cannot be considered as a "clinical" group. This suggests that the presence of mediating factors may mitigate the transgenerational impact of trauma.

As widely stated in the attachment literature [30], the label "insecure" does not necessarily mean clinical disturbance, because many insecure children and adults adapt successfully to the demands of their environment. In fact, Main [46] characterised the ambivalent strategy as the most adequate response to a less optimal child-rearing environment which does not show such consistently sensitive responsiveness which is necessary in order to facilitate the development of a secure bond between the parent and the child. Insecurity should be considered as a risk factor that only in combination with other risk factors, which might lead to mental distress and disorders [47].

In order to examine whether the experimental group differed from the normative group [48] on attachment style, the "proportion difference test" was performed.

The statistical analyses did not show any significant difference, except for the dismissing male category ($Z = 2.314$, $P = 0.021$).

4. Discussion

Many questions remain to be answered regarding such parental transmission of Holocaust trauma. What was in fact passed on from parent to child? How did the transmission occur?

The mechanism of second generation effects needs to be considered as an extremely complex one. Indeed, cumulative trauma of parental communication, the aspects of the parent-child relationship determined by the Holocaust context, as well as the historical imagery provided by the parent and by other cultural processes, are mediated by the ongoing interaction with normative developmental conflicts, family dynamics independent of the Holocaust (including parents' attachment style before the trauma), variables of social class, culture, Jewish heritage and immigrant status.

As a consequence, trauma transmission cannot be understood only from one point of view, but it needs to be approached from a broader and more integrative perspective. It is necessary to take into account the intricate interplay among different levels of trans-generational influence, suggesting that trauma transmission is caused by a complex of multiple related factors (the "relational diathesis viewpoint"), including biological predisposition, individual developmental history, family influences and social situation [49].

Keinan et al. [50] suggested, for example, that some children of Holocaust survivors developed unique coping mechanisms that better enabled them to deal with their parents' psychological burden. Even though parents were deeply traumatized, these children might not have absorbed the trauma because of certain "mitigating effects" that may have helped them to withstand the stress despite everything. According to Sorscher and Cohen [51], numerous studies of these

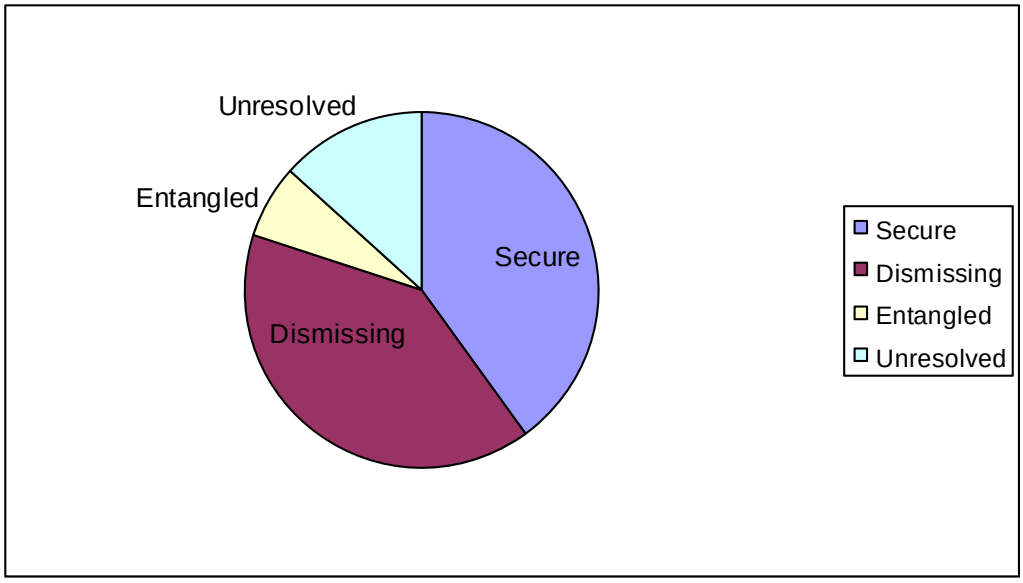

Fig. 1 Experimental group classification.

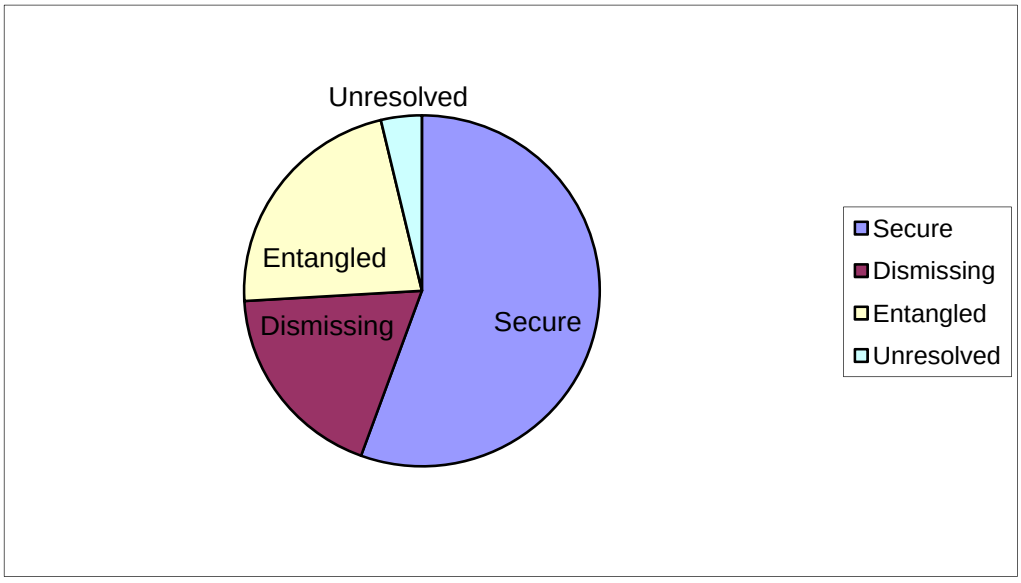

Fig. 2 Comparison group classification.

children have reported a wide spectrum of reactions, both detrimental and adaptive, to the Holocaust. The variety of responses suggests the presence of mediating factors that may mitigate the trans-generational impact of trauma. Parental communication style, in particular, has been identified as a crucial determinant in the adaptation of families beset by catastrophe.

Similarly, Axelrod et al. [52] observed that a major difference between the functional children (the "second generation") and the hospitalised "second generation", seemed to be that the children, while growing up, were exposed to fairly open discussion of parents' camp experiences in "non-frightening" ways.

Furthermore, reparative periods in school, youth movement, summer camp and in other social support systems [53] might have helped the offspring to differentiate from their parents and to alleviate some of their detrimental influence. Indeed, for many such children of survivors, the phase of adolescence became a time for age-appropriate separation and individuation

that helped them move away from home and what it represented.

5. Conclusions

In conclusion, it is possible to say that there are a number of variables that sometimes helped many survivors reinstate themselves in the civil and social environment they came back to, grow up and take care of their children in a sufficiently adaptive way. Therefore, the determining factor of the survivor's disorganized state of mind is not trauma itself, but rather the possibility of elaborating it. As regards the children of Holocaust survivors, it is necessary to take into account the intricate interplay among different levels of trans-generational influence, suggesting that trauma transmission is caused by a complex of multiple related factors, including individual developmental history, biological predisposition, parental communication style (overt or very close, odd and mysterious), family dynamics independent of the Holocaust (e.g. parents' attachment style before the trauma), social situation. The "persistent shadows of the Holocaust" can linger in many different and apparently innocuous but insidious ways, which can only be recognized when fine-tuned tools are used.

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The Strengths and Difficulties Questionnaire: A Pilot Study on the Reliability and Validity of the Self-report Version to Measure the Mental Health of Zambian Adolescents

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Abstract: The study had the objective of exploring the feasibility of using the self-report SDQ-Y (youth version of strengths and difficulties questionnaire) to assess the emotional and behavioural well being of adolescents in Zambia. This was a cross sectional study of Lusaka school children (n = 420) aged 11-15 years using the self-report SDQ-Y and a demographic questionnaire. It was found that compared to a UK normative sample, Zambian adolescents were almost twice as likely to have total difficulties scores in the abnormal range (O.R. 1.9). It was found that there was a significant difference in the total SDQ scores (Z = -2.67, P = 0.008) with children reporting health problems having significantly higher scores. Children reporting health problems also had significantly more emotional problems (Z = -2.78, P = 0.005). There was a trend for children with health problems to score higher on the hyperactivity scale (Z = -1.9, P = 0.053). The internal consistency of SDQ subscales ranged from low to moderate. It can be concluded that SDQ is a useful instrument for use with Zambian adolescents, in particular, the total difficulties score and the emotional difficulties score performed well in this sample and could potentially be used to screen for mental health problems or to examine the impact of interventions.

Key words: Strengths and difficulty questionnaire, adolescents, Zambia, reliability, validity.

1. Introduction

Globally, there seems to be an increase in the mental health problems among adolescents [1], and there are evidences for these problems to interfere with the everyday functioning of adolescents [2]. Therefore it comes as a surprise that only a small number of young people receive any specialised help [3, 4]. The diagnosis and treatment of mental health problems in adolescents may be complicated because much of the time the family and significant others dismiss the problems as normal adolescent turmoil, but it is possible to distinguish normal behaviour in adolescents from serious problems by considering the duration, persistence and impact of the symptoms [5]. The adolescent may be hesitant to seek help because of societal expectations and identity issues [6] further making diagnosis of mental health problems difficult in this age group.

There are signs that rates of emotional and behavioural problems of young people in developed countries are now stable or declining [7], but it is not clear about the pattern in developing countries. Factors such as economic deprivation and serious illness [7, 8] are associated with higher levels of difficulties in young people and this has obvious implications for adolescents in developing countries where the prevalence of poverty and chronic illness is high. It has been found that poverty is associated with higher rates of psychiatric disorder and there is evidence that

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moving out of poverty is associated with reduced levels of behavioural problems [2].

1.1 Zambian Adolescents

In Zambia, adolescence is recognised as a distinct stage in life [9-12] and is categorised as a developmental stage between childhood and adulthood [13] and an age range from 11 years to 18 years is defined as adolescence [9]. There are also research studies confirming that psychological distress is common in Zambian adolescents [12] and is reported that adolescents experience some social stress from the uncertainty of functioning as an adult while they are still children. Zambian adolescents also seem disadvantaged in terms of being educated and it has been reported that only about 30% of Zambian adolescents go to secondary school [13]. Due to the very few junior secondary schools available in the country, many adolescents fail to get school places at the junior secondary schools even though they have passed the exam [13]. It does not come as a surprise, therefore, that the literacy rate among Zambian adolescents is one of the lowest in Southern Africa.

1.2 Measure of Adolescent Mental Health

There is increasing recognition of the importance of focusing on the mental health of adolescents. The risk of developing mental health problems increases in young people [14] and mental health in adolescence also has implications for later physical health through its impact on health related behavior, such as smoking and drug use [15]. Therefore acknowledging that mental health problems in adolescents are a matter of serious concern, it becomes significant to identify a reliable and valid measure of adolescent mental health. A self-report measure may have advantages in countries where the caregiver may have low levels of literacy or may not be a close family member. Evidence suggests that self-report measures of adolescent health are as valid and reliable as parent-rated assessments [16]. Literature search for standardised measure of adolescent mental health used with Zambian adolescents did not find any self-reported measures.

1.3 SDQ (Strength and Difficulty Questionnaire)

The SDQ is a brief screening measure that is increasingly being employed for the purpose of identifying behavioural and emotional problems in children and adolescents [17]. The SDQ has been used in clinical and service activities and over the years has been recognised as a widely used measure of child and early to mid adolescent mental health [18]. When considering some of the commonly used self-report measure of mental health in developing countries, it was found that SDQ has been widely used in many developing countries [19-21].

SDQ has been found to be a useful measure of mental health in both high and low income countries [22, 23] and with school children [24]. When compared to other standardised questionnaires of child and adolescent mental health such as Rutters questionnaire, CBCL (child behaviour checklist) and clinician rated HoNOSCA (Health of the Nation Outcome Scale for Children and Adolescents), SDQ has been found to be a useful measure. For example, in comparison to Rutter questionnaire, it was found that SDQ not only functions as well as Rutter's, but also has the advantages of focusing on both strengths and weakness; better coverage of inattention, peer relationships and prosocial behaviour; a shorter questionnaire; and the same form suitable for both parents and teachers [17].

2. Aim

The aim of the present study was to explore the feasibility of using the SDQ self-report measure to screen for emotional and behavioural difficulties in this sample. Specific objectives were to explore the reliability and validity of the SDQ and the impact of socioeconomic status and perceived health status on mental wellbeing. It is hypothesised that participants with self-perceived health problems and lower socioeconomic status will have higher total SDQ scores.

3. Methods

3.1 Design and Participants

The study was a cross-sectional study of Lusaka school children in the age group of 11-15 years, in the period from April to June 2005. The participants were recruited from basic schools in Lusaka. One of the schools was a girls-only school and the others were mixed schools. The inclusion criteria were that the participants should be attending one of the 5 basic schools in Lusaka which were participating in the study and in school grades 5 to 9.

3.2 Measures

3.2.1 Demographic Questionnaire

Structured questionnaire designed for the study to record demographic information, health information and information about members who lived in the household of the participants.

3.2.2 SDQ-Y

The SDQ-Y is a brief behavioural screening instrument and was designed to be completed by children aged 11-15 years and is used to detect childhood emotional and behavioural problems. The 25 items in SDQ are divided into five subscales comprising of 5 items each, generating scores for conduct problems, hyperactivity/inattention, emotional symptoms, peer problems and prosocial behaviours. The items are scored on a 3-point scale with 0 = not true, 1 = somewhat true, and 2 = certainly true. The subscale scores can be calculated by summing up the scores on relevant items (after recoding reversed items) range of the scores 0-10. A higher score on the prosocial subscale reflects strength, whereas higher scores on other subscales indicate difficulties.

A total SDQ score is derived from 20 items (emotional symptoms, conduct problems, hyperactivity and peer problem subscale), excluding the prosocial subscale. Scores for total difficulties range from 0 to 40, with higher scores indicating more mental health problems. Respondents' scores can be classified as within normal range, borderline or abnormal according to pre-determined cut-offs [18]. The study used the US youth version which is identical to the UK English version but substitutes the term youth for child and has been validated for ages 11-17 years.

3.3 Procedure

Participants were recruited from 5 basic schools[1] in Lusaka. The schools were chosen based on their willingness to participate. The participants for the study were recruited through the heads of the study schools, who were sent a letter explaining the purpose of the study before an appointment was made to visit the school. During the initial meeting with the heads of schools, the information sheets and consent forms were given for the children to take home to parents/guardians. Parents who did not wish their child to participate in the study were able to withdraw their child by sending back the consent form with their unwillingness indicated in it. A week later, the schools were contacted and appointments were made to collect data from students. The researcher and the research assistant met the students from the pre determined grades who had a free period during the appointed time. The purpose of the study was explained to the participants and informed that verbal consent was obtained. SDQ was administered in groups of 20-30 students, grouped according to their year of study (grade). Participants were asked also to complete the demographic questionnaire beside SDQ (US English) and were encouraged to seek clarifications whenever necessary. Standard explanations in simple English were given for some items which did not have a direct equivalent in local dialect and which were unclear to some students (e.g. "nervous" and "fidgeting").

3.4 Ethical Consideration

Ethics approval was obtained from Research Ethics Committee at the University of Zambia prior to the

[1]A Basic School is a government school which offers education from grade 1 to 9.

commencement of the research. The parents/guardians were given the information sheet about the study and given a choice of allowing or not allowing their children to participate in the study. The study and the tasks involved were explained in detail to the participants and they were given the opportunity to seek clarifications after which an assent was obtained from the participants. All information was confidential and questionnaires were anonymous. Participants were free to withdraw from study at any time.

3.5 Data Analysis

Data were analysed using SPSS-15.0 for Windows. Cronbach's alpha coefficients were calculated for the total SDQ scores and for the five subscales to determine the internal consistency of the total SDQ scores and scale scores. SDQ scores of participants were compared using Mann-Whitney U tests for ordinal data and X^2 for categorical data. O.R. (odds ratio) was calculated to compare the SDQ scores of the participants with a UK normative sample.

4. Results

4.1 Response Rate

At the time of the study, there were 702 on role in the targeted year groups of whom 438 (62.4%) were recruited to the study. No child refused to take part but 18 responses (4.1%) were excluded because of extensive missing data and 245 were absent on the day of testing, giving a useable response rate of 59.8%.

4.2 Demographic Characteristics of the Sample

The sample included 227 girls (54%) and 192 boys (45.7%), one participant failed to indicate their sex on the questionnaire and which were in grades 5 to 9. The mean age of the sample was 13.1 years (*S.D.* = 1.2, range: 11-15 years). The majority of participants (55.2%) lived with both parents, 105 (25%) with a single parent, 69 (16%) with relatives (including grandparents) and a relatively small percentage 12 (2.9%) with no family members. Parental occupation was classified using the NS-SEC (National Statistics Socio-economics Classification) 2002. Occupations were allocated into one of 8 categories of occupation and then grouped into professional and managerial, intermediate clerical and technical or routine/semi-routine occupations. In some cases, there was not enough information to reliably assign to a category as children had simply stated a place of work rather than an occupation. The majority of the sample (76.7%) lived in households where someone had a regular job. Nearly one third of the sample (34%) reported having a health problem during the period of data collection. Of those health problems 85 (59.4%) reported visiting a health clinic compared to 58 (40.6%) who did not. This difference was not significant (X^2 = 1.1, df = 1, P = 0.24). There were no age or gender differences between those reporting health problems and those who did not. Nor was there any relationship between reported health status and social variables such as unemployment or family structure.

4.3 SDQ Scores

Data were collected from 420 participants. In some cases, where few responses were missing, the scale score was prorated provided that at least three items in the scale were answered. Using Kolmogorov-Smirnov test of normality, it was found that none of the SDQ scores were normally distributed.

SDQ scores were compared between gender and age. There were no significant gender differences in the total SDQ score, emotional difficulty score, hyperactivity score, and peer problems. However, boys were found to have higher scores on prosocial scale (Z = -2.69, P < 0.01) indicating more positive social behaviours such as kindness to others and girls had higher scores on youth conduct problem scale (Z = -2.09, P < 0.05). There were no significant relationships between age and any of the SDQ scores and the type of occupation was also unrelated to mental health.

Just over a half of participants (55%) lived with both parents but nearly all (97%) lived with at least one

family member. The twelve children who did not live with a family member had higher scores on the hyperactivity subscale ($Z = 2.01$, $P = 0.04$, mean 3.58 *vs.* 2.56). There were no other detectable effects of family structure on SDQ scores but socioeconomic status did have an impact on mental health. Young people in families without a regular wage earner had higher total SDQ scores ($Z = 2.27$, $P = 0.023$, mean 13.40 *vs.* 11.97), lower prosocial subscale scores ($Z = 2.83$, $P = 0.005$, mean 7.30 *vs.* 8.00), higher hyperactivity subscale scores ($Z = 3.37$, $P = 0.010$, mean 3.16 *vs.* 2.40) and higher peer problem subscale scores ($Z = 3.52$, $P < 0.001$, mean 3.32 *vs.* 2.57) but there was no significant difference for conduct problems. The type of occupation of the parent/guardian was found to be unrelated to mental health.

Analysis of the total SDQ scores found that 302 (72.5%) of the participants were in the normal range. Participants were most likely to be in the normal range for the hyperactivity subscale (93.9%) with only 3.6% in the abnormal range. In contrast conduct problems had least number of participants (62.3%) in the normal range. There were no significant gender differences in the "caseness" of total SDQ score, hyperactivity, emotional symptoms, conduct problems and peer problems. However there were significantly higher number of girls in the borderline and abnormal category of the pro social scale ($X^2 = 7.215$, $P < 0.05$) indicating girls were more likely to have prosocial problems.

Scores for the Zambian sample were compared to a normative UK sample [5]. The Zambian population had higher rates of total difficulties, peer problems and emotional difficulties in the borderline or abnormal range but markedly lower rates of hyperkinetic problems (Table 1).

4.4 Presence of Health Problems and SDQ Scores

On comparing the presence of health problems and SDQ scores, it was found that there was a significant difference in the total SDQ scores ($Z = -2.67$, $P = 0.008$) with children reporting health problems having significantly higher scores. Children reporting health problems also had significantly more emotional problems ($Z = -2.78$, $P = 0.005$). There was a trend for children with health problems to score higher on the hyperactivity scale ($Z = -1.9$, $P = 0.053$) (Table 2). There were also significantly higher number of participants in borderline range (18.5%) and abnormal range (19.6%) for emotional difficulty when health problem was reported ($X^2 = 8.09$, $df = 2$, $P < 0.05$).

4.5 Reliability of SDQ

Cronbach alpha coefficients were calculated for the total scores and for the five subscales to determine internal consistency of the items. Chronbach's alphas for the total score approached good internal consistency ($\acute{\alpha} = 0.66$). Internal consistencies for emotional symptoms ($\acute{\alpha} = 0.55$) and the prosocial scale ($\acute{\alpha} = 0.53$) were adequate. Internal consistency for hyperactivity ($\acute{\alpha} = 0.43$) was low and very low for conduct disorders ($\acute{\alpha} = 0.23$) and peer problems ($\acute{\alpha} = 0.19$). Scrutiny of individual items in the scales with low internal consistency revealed that item 7 "I usually do as I am told" correlated very poorly with other items in the conduct scale.

5. Discussion

The objective of the present study was to evaluate the reliability and validity of SDQ-Y as a research tool to assess emotional and behavioural well being of adolescents in Zambia.

5.1 Principal Findings

There was evidence in the study to suggest that the SDQ youth report is a reliable and valid measure of mental health for use with Zambian adolescents. Internal consistency was acceptable for total difficulties, emotional behaviours and prosocial behaviours, however it was poor for hyperactivity and very poor for conduct disorders and peer problems. The total difficulties score and emotional difficulties score

Table 1 O.R. for SDQ-Y scores of Zambian school children (n = 420) borderline or abnormal range for the sample compared to UK sample normative sample (n = 4,228).

	School sample % (n)	UK sample* % (n)	O.R.
Total difficulties	27.8% (116)	16.5% (698)	1.9 (1.5-2.4)
Emotional symptoms	30.1% (126)	11.2% (474)	3.4 (2.7-4.3)
Conduct problems	37.0 % (155)	21.0% (888)	6.2 (5.0-7.7)
Hyperactivity	7.4% (31)	21.0% (888)	0.3 (0.2-0.4)
Peer problems	34.4% (144)	9.2% (389)	5.18 (4.1-6.5)

*UK data is taken from www.sdqinfo.com.

Table 2 SDQ scores and reporting of health problems.

SDQ scores	No reported health problems (n = 269)	Reported health problems (n = 143)	P-value health problem *vs.* no health problem
Total difficulties mean (*S.D.*)	11.78 (5.6)	13.1 (5.17)	$P < 0.01$
Prosocial mean (*S.D.*)	7.9 (1.9)	7.8 (2.1)	NS
Emotional symptoms mean (*S.D.*)	3.8 (2.4)	4.5 (2.4)	$P < 0.01$
Conduct problems mean (*S.D.*)	2.8 (1.9)	3.0 (1.7)	NS
Hyperactivity mean (*S.D.*)	2.4 (2.4)	2.8 (2.1)	$P = 0.05$
Peer problems mean (*S.D.*)	2.6 (1.9)	2.8 (1.9)	NS

NS = not significant.

discriminated well between those with health problems and those without supporting the validity of these measures. When compared to a UK normative sample, the sample in the current study had higher rates of total difficulties, emotional problems, peer problems and conduct disorders but very similar rates of prosocial behaviours. Rates of hyperactivity were markedly lower than the UK normative sample.

5.2 Evidence for Reliability of SDQ-Y

Studies have explored the reliability of SDQ in various cultures. The internal consistency of the self report SDQ has also been assessed in the Dutch [25], Swedish [19], Arab [26] and Finnish studies [18] and findings across these populations have generally supported the internal reliability of the measure. In the current study, Cronbach alpha coefficients for the SDQ total and sub scale ranged from good to low. The internal consistency for total SDQ score ($\acute{\alpha}$ = 0.66) and emotional problem scale ($\acute{\alpha}$ = 0.55) was good and for hyperactivity scale, peer relations and conduct problem scale was low. This might reflect cultural differences in the expression of behavioural problems since there were marked differences between the UK and Zambian populations in these areas. A recent study exploring the factor structure of the adolescent self-report version of the SDQ identified problems with the hyperactivity subscale [27].

Similar to the findings of this study, the Chinese study reported low internal consistency for conduct problems ($\acute{\alpha}$ = 0.33). The internal consistency of total SDQ ($\acute{\alpha}$ = 0.57) and emotional subscale (0.59) were also comparable to the present study. Other SDQ translations have also found similar internal consistencies, e.g. the Arabic version [26] and the self-rated Dutch version for 8 years-old to 10 years-old [18]. A UK study also found low alpha coefficient for self rated peer problems [17] and a study of Norwegian teenagers using the self-report measure [24] found that conduct disorders had the lowest internal consistency. There was no effect of age effect on SDQ scores. This might again indicate the reliability of this measure in the population as it was suggested that measure was appropriate across age ranges.

5.3 Evidence for Validity of SDQ-Y

As predicted, there was a significant increase in total SDQ scores, emotional difficulty scores, and conduct

problem scores when health problems were reported. Health problem also significantly contributed to increase in borderline and abnormal cases in emotional difficulty sub scale. Therefore, it may be assumed that young people who report health problems may have more emotional and behavioural difficulties than those who perceive themselves to be healthy. This is in agreement with other studies which have found higher rates of emotional problems in children with health problems [8, 28]. This also provides some support for the validity of the SDQ in this population but further work is needed.

The total difficulties score was similar to that of the UK normative sample. This is in conformity with other studies carried out in developed countries which have found total difficulties score of SDQ-Y to be similar to that of British sample [29]. The mean scores for the prosocial scale, which could be considered to reflect the influence of social desirability, were also very close to the mean of 8.0 found in the UK sample. Similar to the study, low rates of hyperactivity have been found in other non-European samples [30]. This also supports the validity of the measure in this sample.

Contrary to expectation, the type of job (social class) of the parent/guardian was not related to the SDQ scores. This is in order with the finding of a school study carried out on age group similar to the sample in east London on a large sample of mixed ethnic group of children found psychological distress similar to national UK samples [29]. The Bangladeshi pupils in this sample although were from disadvantaged families, had lower rate of psychological distress. The lack of socioeconomic effect on SDQ score may reflect the homogeneity of the same on this variable.

Another study [2] found that poverty was associated with behavioural symptoms such as hyperactivity, but not emotional symptoms; that moving out of poverty reduced behaviour problems but this had no impact on emotional symptoms. It was found that the participants from families without regular income (economic disadvantage) seemed to have higher externalizing problems such as conduct disorder. The children who did not live with a family member (indicative of disadvantage) also had higher rates of hyperactivity.

5.4 Strengths and Weakness of the Study

The major strength of the study is the use of a large sample and moderately good response rate. However the sample may not have been a representative sample of Zambian adolescents as most of the participants lived in homes with an earning family member and majority lived with both parents. The high rate of participants absent on the day of the study may have had some impact on the representativeness of the sample. Also the study was reliant on self-report of psychological problems, without triangulation by parent and teacher reports validation may not be accurate [24]. However it was felt to be too onerous to ask a single teacher to complete the SDQ for each child in the class. Furthermore, it was likely that only well educated parents would have returned completed SDQ questionnaires which would have introduced bias. It may have been useful to establish concurrent validity by comparing scores with those obtained for a questionnaire already validated in this population but unfortunately there was not one available.

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Satisfaction, Professional Mobility and Leadership in Academic-Scientific Organizations

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Abstract: The research work has been done in the field of social and organizational psychology. It is aim to analyze the factors which influence the levels of satisfaction and achievement reached by those working for scientific organizations and their relationship with professional mobility (Andrews, Aichholzer, Cole, Mittermeir, Stole-Heiskanen, UNESCO—United Nations Educational, Scientific and Cultural Organization, 1971) [1]. A stratified sample was taken from universities and different disciplines, based on a population of teachers from the Cuyo region (N = 355 R + D—Research & Development Units) (5% error margin). At this first stage, the research teachers were from Universidad Nacional de Cuyo (N = 53 Research Units): one chief or director and members. Quantitative techniques were used (two questionnaires). The results show that researchers' satisfaction at different levels is connected with professional mobility and disciplinary fields. Regarding leadership, and considering professional mobility, a general feeling of satisfaction emerges among researchers, regardless of their disciplinary field.

Key words: Professional mobility, satisfaction at work, scientific organizations, leadership.

1. Introduction

For decades, researchers have been looking for factors which affect effectiveness within organizations, scientific ones among them.

Research became more and more common in the field of business organizations and has extended to the present. It then reached the domain of education and, more specifically, the field of assessment of the education system quality. The aspects dealt with include teaching-learning processes, activities concerning extension (transference and impact) and those related to scientific research. Most of the studies, however, aim to the analysis of said processes from perspectives such as efficiency and efficacy. The effectiveness and importance or impact of the University System in relation with contextual demands is an aspect which has been somehow forgotten. Along the same lines, the impact made by the latest programs for the strengthening of research work in the academic field, as well as the analysis of mechanisms underlying the effectiveness of the scientific-technological system, had not been yet discussed [2]. For that reason, this work evaluates the quality of the academic-scientific sub-system, based on the research done, its effects and conditioning factors.

It would like to mention only some axis-antecedents involving scientific and/or academic-scientific organizations, a field where research is scarce, contrasting with the amount of literature available on effectiveness in other contexts. The important research done by the UNESCO (1979) will be the referent [3].

In a deeper analysis, it will deal with antecedents involving both psychosocial and organizational factors, which appearing as more significant in the work, showing its connection with effectiveness or factors associated with it. It has also included socio-sychological factors, such as professional mobility—for reasons which will be explained below, as well as psychological factors, such as professional

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satisfaction according to disciplinary fields.

Therefore, the analysis takes some elements from the interactionist model, with a sociological-structuralist and classical sociopsychological orientation [4-8].

Take a look at the theoretical framework now.

1.1 International Framework

Literature on factors which affect organizational work and group productivity is abundant, but results are somehow controversial. Motivation and leadership are among them. As far as human relationships are concerned, sociological issues, together with strictly psychological factors play an important role in them. Regarding the latter, it is generally assumed that "good leadership results in higher workers' morale, and this, in turn, in an increased effort which eventually leads to higher productivity in the organization" [6].

Further research on the topic, however, leads to an "increasing disappointment" [9], since the relationship between bosses' behavior, work atmosphere and productivity is not a simple, easy topic to understand.

House and Wigdor [10] found considerable evidence that both satisfaction and the atmosphere at work depend on the alternatives perceived and made accessible to the individuals, such as sex, age, education, professional culture, status, etc.

Etzioni [11, 12], following Rossel [13], related the level of engagement required by an organization to the type of leadership which would be effective, claiming that the larger the engagement expected, the more important the formal role of leadership.

In his "Contingency Theory", Fiedler [14] showed that the atmosphere in the group had considerable influence on the effectiveness of the different styles of leadership. Such theory led to a number of attempts to determine those variables which were contingent to leaders' behavior.

The instances of research done on the topic are too many to be mentioned here. However, as research increases, so does, the paraphrasing [9], a "growing disappointment", since the relationship between bosses' behavior, atmosphere at work and productivity is not simple or easy to understand. There are two objections to the situation: the literature on the topic is vast but findings are few, according to Meyer [15], making reference to the existing, inconsistent empirical evidence. In the second place, much of the research done seems to underestimate the conflict of interests existing between the goals of the organizations and those of the individuals, conceiving organizations as "moral" and cooperative by nature. In addition, the complexity of the phenomenon makes a linear reading difficult. Criticism suggests that the importance of the influence of leaders regarding both the atmosphere and productivity is still an issue to be analyzed theoretically, taking into consideration the characteristics of the structure of a specific organization, the meaning of that role for the individual and the mutual influence between the subject and the structure within a permanent interplay.

Concerning the role of the leader in academic units of research and management of scientific organizations, it must be said that not much literature has been written on such topics, most of which refers to academic organizations.

1.2 National Framework

The paper, called "Scientific Research: Organization and Quality of the Research Units" (R + D[1], Research & Development Units), is based on the International Comparative Study carried out by UNESCO between 1971 and 1989 in many countries, among which was Argentina[2]. Work included a macro level (scientific policies) and a micro level (a study with the members of each Research Unit).

It will discuss here some of the findings at the micro level—including the chief and members of each

[1]R + D stands for "Research Development Units".

[2]Research was carried out in two stages: 6 countries took part in the first and 165, in the second. Some members of the research team were part of the study (first in the development of the design of the research work and later in the application).

R + D[3], an instance without which access to the psychosocial aspect (variables involved) and its interaction with the structural aspect could not have been possible. Regarding the macro aspect, this work is the first ever done in the frame of the National System of Science, Technology and Innovation, and, more specifically, of the Incentive Program for Teachers-Researchers since its implementation on State Universities in 1995. Its main objective was to support research work in universities so as to put an end to the typical isolation which characterized research work in relation with the university, the productive and the science and technical systems, and to develop highly-qualified human resources for research.

Let us now discuss the research sub-project.

The strategy of analysis was macro-meso-micro-macro. The task was personalized in each Research & Development Unit, and its core members followed the international definitions on the issue. This is the main difference with the international work taken as a referent. Working with each member made the inclusion of qualitative methodology possible, to later go through data triangulation. The researchers analyze here results obtained through quantitative methodologies (Pearson co-relation, development of scales and indexes)[4].

Among the wide range of variables included and linked by literature to the effectiveness of academic-scientific organizations are a large number of psychosocial factors.

The main objective of this work was to analyze the relationship existing between human (psychosocial) and material (resources) factors, and the efficiency of the research units.

To achieve this, some grids and indexes were developed, especially concerning the product. As far as human factors were concerned, many grids and indexes were included, especially connected to satisfaction at work.

One of them evaluated the units' director or chief, in other words: the leaders.

At this point, it was decided that an analysis would be carried out to determine the relationship between such human factors (psychosocial or other existing variables) and the mobility observed among researchers belonging to different disciplinary[5] fields.

In the first place, professional mobility in the scientific system, as well as in the academic one, is determined by the number of publications. Other factors play only a secondary role in this sense. In other words, it should transmit levels of production and quality. Furthermore, mobility becomes of interest because it combines both a psychological and a sociological perspective, namely the subject (his hopes, expectations and conflicts), the structure (regarded as a scientific-occupational pyramid) and both in permanent interaction.

This aspect is especially relevant in present-day Argentina, since the structural barriers imposed by the system could become a source of conflict and generate psychosocial patterns which may affect academic-scientific organizations internally.

In other words, it was estimated that results concerning scientists' satisfaction at work could vary if there were real promotion in the science and technical system, the discipline they belong to may also influence both factors and levels of satisfaction.

Finally, no literature on the topic specifically links professional mobility to satisfaction at work; although promotion has become a concern in a conflictive working world, together with the problem of insertion and "surviving" within the system. The topic becomes an issue once more among international experts in

[3]"R + D" is "1" in the Spanish version from Argentina.

[4]From a methodological point of view, the steps followed were the same as those in the research done by UNESCO.

[5]The International Standard Nomenclature for Fields of Science and Technology was used (UNESCO, 1971-1989). It was only logical that the "disciplinary homogenization" referred to by the author (systems of beliefs, values and assessment, which differ according to the disciplinary field they belong to—"hard" or "soft" sciences—associated to socialization and traditions), will show a different level of satisfaction concerning the different psychosocial factors at stake in the grids created.

2000 [16, 17][6]. Similarly, it has found no works dealing with mobility and satisfaction in scientific organizations or according to disciplinary fields.

In such framework, the general hypothesis guiding this work has been that the action logics, and, particularly, the levels of satisfaction and associated response mechanisms, would vary according to professional mobility and researchers' specialized field of work.

2. Methodology and Methods

2.1 Sample

A stratified sample was taken from universities and different disciplines, based on a population of research teachers of the Incentive Program, both from the metropolitan and the Cuyo regions (N = 1511). The final sample is N = 355 R + D[7]. At this first stage, the research teachers were from Universidad Nacional de Cuyo (N = 53 R + D): one chief or director and members.

Before forming the groups, the National System of Science, Technology and Innovation made a categorization of the researchers. First, the categories ranged from A to D, and then, from 1 to 5. Only researchers with a category of 1 or 2 were able to be chief-directors, for they had a full-time research position (either because they belonged to Science and Technical organizations, such as CONICET—National Council of Scientific and Technical Research—or because they were full-time teachers with over 25 hours of research per week at their university).

2.2 Techniques

Both qualitative and quantitative techniques were used: anecdotage and non-obstructive observation for the former; and two questionnaires for the latter[8], which were the core instruments.

The questionnaires are:

(1) The questionnaire concerning the R + D units was answered only by chief-directors, who informed about that unit (human and financial resources, scientific exchanges, age of the research units, national and foreign income resources and the product, among others).

(2) The CM questionnaire, answered by the Core Members, is a part of a number of instruments whose main purpose is to give relevant data about the members of the R + D units and the specific ways of organization concerning quality. It includes objective data (personal and institutional-disciplinary profiles), opinions and social representations of the members of the R + D units on levels of personal participation in the different research activities, atmosphere at work (devotion, cooperation, interference, etc.), employment (pressure, responsibilities, engagement, etc.). Also, opinions about the budget, means and services available in the Unit were included; about levels of satisfaction with their boss (frequency in relations, their effect on scientific performance, professional competence). It also includes information about power and influence in decision making, about the organization of research, about relationships both inside and outside the institution (frequency, effects on performance and satisfaction), personal opinion about the importance of the kind of product for the goals of the R + D unit and satisfaction concerning the spreading of the results. Finally, it provided information on topics related to the effectiveness of the R + D units, their production capacity, and their possibility to conceive innovative contributions and comply with quality regulations. The questionnaire

[6]It is well known that socio-professional mobility was a central issue in psychology of education in the 70's and 80's. It was later set aside by the growing problem of insertion and staying in the working world. Today, both sociologists and psychologists are interested in the topic once again.

[7]5% error margin.

[8]Questionnaires were adapted by the author, taking the one used by UNESCO for the International Study in Organizations and Performance of Research Units as a referent. Instruments were updated on the basis of the findings and the requirements of the topic. An addenda was included in order to observe other aspects. As mentioned above, a quantitative methodology was used in this case.

was answered by every core member in the research unit, including trainee researchers and scientists. The R + D Unit Director—as a member of the group—also completed it.

2.3 Scales and Indexes

The answers obtained in the Core Members Survey gave rise to a number of grids and indexes which were later matched to other variables, among which are production (as an indicator of efficiency), professional mobility (as an indicator of achievement, especially in the field of science) and the corresponding disciplinary fields.

As far as we are concerned, 7 satisfaction scales—which will be discussed below—were prepared, in addition to a product and a professional mobility scales.

2.3.1 Professional Mobility Grid

The following aspects were considered:

- Position within the research group: director/member;
- Position within the academic system, which was combined with time dedication (exclusive, semi-exclusive or simple). It comprised every existing category in the national system, going from full time professors holding a permanent chair, and from full and part-time assistant teachers;
- Seniority: (1) up to 5 years; (2) 6-10 years; (3) 11-15 years; (4) 16-20 years; (5) 21-25 years.

The index varied between 4.67 and 100.00, with the mean (or average satisfaction) of 53.99 and the standard deviation of 25.53, the lowest observed.

2.3.2 Satisfaction Scale

Items are based on the Liker scale from 1 to 5, being 5 the most positive situation and 1, the most negative. The subject had to give his/her opinion about each of the pairs of opposite statements (X-Y), grading them as follows: (5) X is applicable; (4) Tendency to X; (3) Middle way; (2) Tendency to Y; (1) Y is applicable.

Indexes were made by adding up the total score for each of the items, divided by the figure resulting from 5 times the number of items.

Take a look at a summary of the resulting satisfaction indexes and at a descriptive analysis of them, considering their level of satisfaction.

As shown in the grid, the highest level of satisfaction is present in the variables planning (88.75) and atmosphere at work (80.54), whilst the index for professional mobility is among the lowest (53.99).

2.3.3 Product Scale

Three clusters were considered[9]:

(1) Books and publications: 4 (books); 3 (foreign articles); 2 (national articles) and 1 (reviews).

(2) Patents and prototypes: 3 (patents), 2 (algorithms) and 1 (experimental material).

(3) Reports and algorithms: 3 (internal reports), 2 (algorithms) and 1 (routine reports).

The box speaks by itself. In the last two categories, the figures for the mean are low with low deviations, which imply more homogeneity. In the “Publications” category, however, the mean is clearly higher than the previous ones, but the deviation is also a large figure. That indicates that the population is more heterogeneous in relation with the category: certain researches write for different publications (bosses) while others just do not. Likewise, a General Index of Satisfaction was developed, shown in table 4.

2.4 About the Satisfaction Scales

Below are briefly described the satisfaction scales, which show significant differences[10].

2.4.1 Scale L: About the Job

This set of 12 questions referred to the individual’s feelings towards work, including topics such as quality of overtime work, time pressure and the researcher’s level of responsibility at the moment. Opinion was expressed by choosing a number for each pair of the following, opposite statements: permanence in the position, wish to leave the unit, opinion about

[9]The criterion used was that of the international study of reference.

[10]Names in the scale remain the same as that of the previously mentioned UNESCO research work.

performance, voluntary overtime, level of responsibility, time pressure, other job opportunities, salary, promotion prospects, etc.

The index varied between 35.00 and 91.67 with the mean (or average satisfaction) of 61.68 and the standard deviation of 12.28, which indicates a moderate level of satisfaction with respect to the variable.

2.4.2 Scale N: Satisfaction with Chief of Research Unit

There were 8 items in all. Individuals had to give their opinion about 8 topics, choosing for each pair of opposite statements the number which they felt was closest to their feelings and satisfaction. They included the level of satisfaction with their bosses' competence, his/her personality, his/her qualifications as a leader, his/her workload, his/her support to the other researchers in the team and a final item concerning contact with their supervisor which is beneficial for scientific and technical performance.

The index varied between 2.50 and 100.00, with the mean of 74.30 and the standard deviation of 26.28, which indicates a high level of satisfaction.

2.4.3 Scale O: Planning and Organization of Research Activities in the Unit

It includes 13 items. The subject was asked to assess his/her unit's organization and work panning, choosing a number for each pair of opposite statements given: interest in the research activities, scientific meaning; prospective success of its application; information about current research work, scientific-technological goals; deciding on unit's budget; coherence in the research program, adequacy of research planning; relations with potential users, nature of the research work; taking part in research planning; social usefulness; information about research planning.

The index varied between 50.77 and 100.00, with the mean of 88.55 and the standard deviation of 10.01,

Table 1 Mobility index.

	Minimum	Maximum	Mean	Deviation
Mobility index	4.67	100.00	53.99	25.54

Table 2 Satisfaction indexes.

	Minimum	Maximum	Mean	Deviation
Planning	50.77	100.00	88.76	10.01
Atmosphere at work	44.71	96.47	80.54	10.59
Supervision/boss	2.50	100.00	74.30	26.28
Level of satisfaction with co-workers	6.67	100.00	63.42	25.29
Material factors	21.54	92.31	62.00	14.77
About your job	35.00	91.67	61.68	12.28
Responsibility	10.00	100.00	58.70	28.02

Table 3 Index of product[11].

	Minimum	Maximum	Mean	Deviation
Publications	2.00	45.00	15.94	8.65
Patents and Prototypes	2.00	9.00	4.56	2.10
Reports and Algorithms	2.00	20.00	9.26	4.42

Table 4 General index of satisfaction.

	Minimum	Maximum	Mean	Deviation
General Index of Satisfaction	25.93	88.89	68.72	13.20

[11] It is worth mentioning that the product referred to is the one associated to the project, which is three years old; it is not the result of the scientific career. It becomes necessary at this point to separate the product from the directors or chiefs in the U + D, who are, according to regulations, full time researchers and whose production is clearly higher than that of the other members of the teams, who are trainee researchers. In the case of chiefs and bosses, the problems tackled by the most important project of the last three years are related to older programs, which result in higher production.

which indicates the highest level of satisfaction in the variables considered.

2.4.4 Scale I: Responsibility

The following aspects were considered: acceptance of the level of responsibility; (voluntary) overtime at work; acceptance of personal responsibility for results; rejection to make random factors responsible for the results-regardless of personal commitment and effort.

The index varied between 10.00 and 100.00, with the mean of 58.70 and the standard deviation of 28.02. These figures show one of the lowest levels of satisfaction in the variables considered.

3. Results and Analysis

Levels of satisfaction, it was observed, are not independent from professional mobility or from the associated fields of specializations:

A significant association exists between professional mobility and satisfaction at work, with no distinction between "hard" and "soft" sciences (disciplinary fields);

Making a distinction between the two types of sciences, it can be detected that there exists a different association between the factors playing a role in the variables satisfaction at work and professional mobility in both "hard" and "soft" sciences;

No co-relation was found between mobility and product;

General in satisfaction on the part of the subjects towards their bosses or leaders became a relevant issue of these scientific-academic *sui generis* organizations.

Let us analyze these results.

3.1 Co-relation between Professional Mobility and the Index of General Satisfaction

The co-relation between the index of general satisfaction and mobility was a significant one: 5% ($r = 0.450^{**}$, $P < 0.05$).

3.2 Co-relation between Professional Mobility and Indexes of Satisfaction

After the scales were created and indexes calculated, the mobility index was co-related to the different indexes of satisfaction.

It becomes clear that there is a positive significant association between professional mobility and the indexes for satisfaction at work, responsibility for specific tasks and planning, and a negative significant association with the boss/supervisor.

3.3 Co-relation between Production and Indexes for Professional Mobility and General Satisfaction

There are no statistically significant co-relations. In other words, there is no evidence of associations between production and general satisfaction. The same thing can be said about production and mobility.

3.4 Co-relation between Professional Mobility and Satisfaction in "Hard" and "Soft" Sciences

Considering now "hard" or "soft" sciences as variables, we observe that, in the context of "hard" sciences, professional mobility is positively and significantly associated to the indexes for job (0.48 at 1%) and responsibility (0.57 at 1%). There is, in addition, a negative significant co-relation with the index for Satisfaction with bosses or directors (-0.45 at 1%).

Here, a negative and significant association can only be found in the index for satisfaction with the supervision or the unit's leader (-0.456 at 5%), while there is a positive association with planning (0.354 at 5%).

Analyzing the grid of co-relations (Pearson), we can see that significant associations at 1% and 5% between professional mobility and satisfaction are different in the "hard" and "soft" sciences grid, which implies that each disciplinary group values different aspects of satisfaction.

In other words, the most movable subjects in "hard" sciences find satisfaction in some aspects—typically present in their discipline—which are different from those in "soft" sciences [18, 19].

There is only one aspect in common: researchers from both fields feel they are not satisfied with leadership in their teams.

Table 5 Co-relation between professional mobility and indexes of satisfaction.

	Atmosphere at work	About the job	Responsibility	Material factors	Supervision	Planning	Satisfaction with co-workers
Mobility index	0.086	0.370***	0.407***	-0.013	-0.436***	0.276**	0.028

*Significant co-relation 10%, $P < 0.10$;
**Significant co-relation 5%, $P < 0.05$;
***Significant co-relation 1%, $P < 0.01$.

Table 6 Co-relation between production and indexes for general satisfaction and mobility.

	Matrix of Co-relation	Publications	Patents and prototypes	Reports and algorithms
General satisfaction index	Co-relation	-0.45	0.79	0.141
Mobility index	Co-relation	0.205	1.22	0.043

Table 7 Co-relation between professional mobility and indexes of satisfaction.

"Hard" sciences	Atmosphere at work	About the job	Responsibility	Material factors	Supervision	Planning	Satisfaction at work
Mobility index	0.040	0.488***	0.576***	0.011	-0.455***	0.278	0.038

*$P < 0.10$;
**$P < 0.05$;
***$P < 0.10$.

Table 8 Co-relation between professional mobility and satisfaction indexes.

Social and human sciences	Atmosphere at work	About the job	Responsibility	Material factors	Supervision	Planning	Satisfaction at work
Mobility Index	0.122	0.233	0.180	-0.013	-0.456**	0.354**	0.030

*Significant Co-relation 10%, $P < 0.10$;
**Significant Co-relation 5%, $P < 0.05$;
***Significant Co-relation 1%, $P < 0.01$.

4. Discussion

This result could be interpreted from different points of view.

From the "expectation" theory, it can be assumed that the most movable subjects (those who have climbed the corporate ladder) tend to have higher expectations once they have reached a high position in the professional pyramid, thus demanding more and more from those leading the system [20].

From the "investment"-model point of view [21], those who have reached a higher position and made a greater effort towards higher achievements of the group may expect more benefits, many of which are associated to management[12].

Finally, it is not surprising that, in the present structural crisis, the index for mobility satisfaction is among the lowest of all. Thus, it becomes obvious that some psychosocial factors are mixed with other structural ones.

5. Conclusions

In the light of the hypotheses, let summarize the findings.

In the frame of the research done, and considering the little literature existing on the topic, it was only logical to expect mobility to be associated with general satisfaction at work. Similarly, and from a disciplinary-institutional homogenization perspective (due to factors concerning socialization), different satisfaction patterns were expected among researchers belonging to different disciplinary fields ("hard" vs. "soft" sciences).

[12]It is surprising, however, that it was that very group which showed some insatisfaction towards the results, an issue in which the leader have a relevant role (the mean: 61.30 with the standard deviation of 15.38).

It was also expected that the product would not with the mobility observed in teachers-researchers, even if, at first, it appears to be a contradiction: in a balanced structural system, it is the product which favors mobility. This paradox, however, can be explained considering the structural situation of the country. Nowadays, many researchers who, after having been evaluated favorably within the Science and Technical System, have to wait a long time before they are actually promoted, due to economic reasons, among others. Promotion is, in many cases, merely "symbolic", not real. This problem is common among the lesser developed countries, where the symbolic channels-typically, education and politics go before the institutionalization of the economic and technological areas, leading to collective anomia [22].

The hypotheses were confirmed. The "unexpected" finding, however, was the realization of a general dissatisfaction with those who manage scientific teams, regardless of the disciplinary field they belong to. The fact can be analyzed from different theoretical viewpoints. It is worth mentioning, however, that processes concerning research and development (R + D) involve psychological, social and structural factors, as Andrews [3] points out. They claim that, regardless of the different realities in different countries, the relationships between the factors discussed and the performance of the Research and Development units, tend to show patterns which go in the same direction. Psychosocial and structural factors complement each other in the Science and Technical System, and only from such interplay, quality, performance and impact of these small organizations known as research and development units can be analyzed. The hypothesis, through which "logics of action and, especially, satisfaction levels and associated response mechanisms would vary according to professional mobility and according to researchers' field of specialization", was confirmed, as well as some generalized rejection towards leaders in the scientific field.

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Assessing the Effectiveness of Xpert MTB/RIF in the Diagnoses of TB Among HIV Smear Negative TB Patients in Nigeria

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Abstract: Through KNCV/TB CARE I Project, the first set of 9 Xpert MTB/RIF machines were installed in Nigeria in 2011 with additional 6 machines in 2012 for improved diagnosis of TB and DR-TB in the country. The study assessed the performance of the Xpert MTB/RIF machines over the period of 2011-2012 in various locations and its impact on TB diagnosis among PLHIV (people living with HIV). A total of 3,725 sputa samples were tested by Xpert MTB/RIF machines. Of these, a total of 463 (12.4%) sputa samples were from PLHIV AFB smears negative suspects. Three hundred and fifty seven (77.0%) sputa samples tested MTB negative, 78 (17.0%) tested MTB positive while 28 (6.0%) samples had error results. This indicated an additional diagnostic yield of about 17.0% over AFB test. Of those that were MTB positives, 5 (6.4%) had resistance to rifampicin. The study shows the need to expand Xpert MTB/RIF services to ART centres as well as to other states of the country to aid early detection and diagnosis of TB in PLHIV patients and MTB Rifampicin resistance cases as well as prevent transmission or resistance strains of TB.

Key words: PLHIV, Xpert MTB/RIF, tuberculosis, smear negatives.

1. Introduction

Nigeria is ranked 10th among the 22 TB high burden countries in the world with an estimated incidence rate of 118 per 100,000 population [1, 2]. The situation is further aggravated by the high HIV prevalence rate estimated at 4.1% [3]. The association between HIV and TB has been documented severally in Refs. [4, 5], yet the uptake of AFB (acid-fast bacilli) screening among PLHIV (people living with HIV) does not yield optimal diagnostic test results. In their assessment, Lawn [4] further noted the shortcoming of the WHO recommended symptom screening in detecting TB in HIV smear negative patients and the lack of appropriate diagnostic tools. Shah and Kumar et al. [6] noted the inability to curtail the transmission of TB as a reason for the lack of significant achievement in global TB control efforts.

In 2010, the total number of PLHIV patients screened for TB in Nigeria was 244,023 [3]. This figure declined slightly by 8.2% in 2011 as only 223,933 PLHIV patients were screened for TB [2]. Mortality and morbidity of HIV infected patients were increased by TB [4]. The emergence of multi-drug resistance TB has further complicated the issue, thus requiring more improved diagnostic procedures [7]. Though the

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affordability of the AFB smear microscopy and its high specificity is not in contention, the tests ability to detect TB cases is low [6]. The unveiling of new diagnostic procedures such as the Xpert MTB/RIF assay has helped to ensure the detection of rifampicin resistance and in much shorter time duration [4, 7]. Nigeria recently introduced Xpert MTB/RIF machines as a screening tool for drug resistance TB and TB diagnosis among PLHIV/AIDS. As part of the implementation of Xpert MTB/RIF services, National Diagnostic Algorithms for Xpert MTB/RIF were developed, one for diagnosis of DR-TB among DR-TB suspects (Fig. 1) and second for TB among PLHIV (Fig. 2). The algorithm for TB diagnosis among PLHIV indicates that all TB suspects among PLHIV should have their sputum examine by microscopy for AFB and only AFB smear negative patients are referred for Xpert MTB/RIF test. The first set of Xpert MTB/RIF machines were installed by KNCV/TB CARE I in 9 health facilities, and the country is in the throes of scaling up Xpert MTB/RIF services to other sites. The study is aimed at an assessment of the performance of Xpert MTB/RIF in detecting TB among AFB smear negative HIV patients and, to assess the prevalence of MTB-RIF resistance in HIV patients. This would aid the decision making process for the siting of Xpert MTB/RIF machines in appropriate locations in the country.

2. Materials and Methods

2.1 Study Location

The study locations consist of 15 sites in the 14 states with the Xpert MTB/RIF machines. 13 of the machines are in facilities that offer both TB & HIV

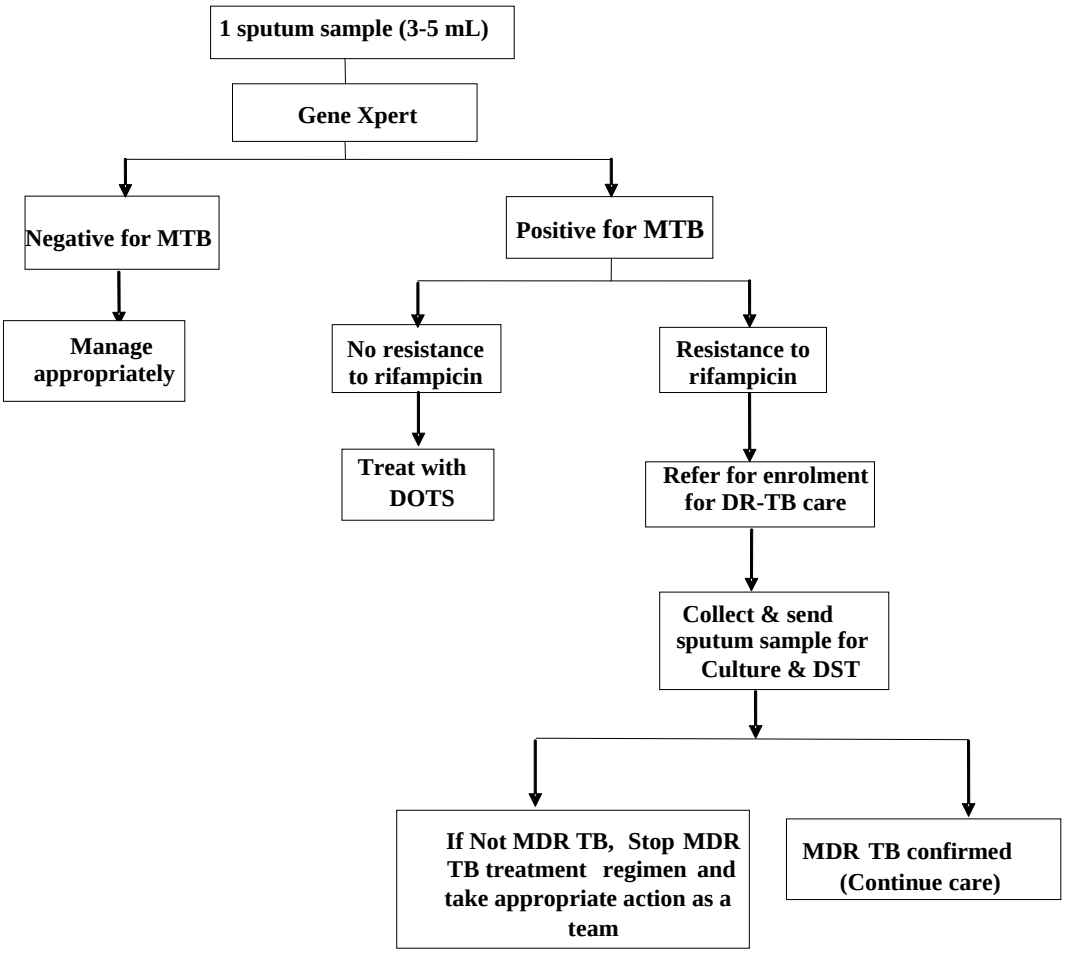

Fig. 1 Diagnostic algorithm for the Xpert MTB/RIF among presumptive DR-TB.

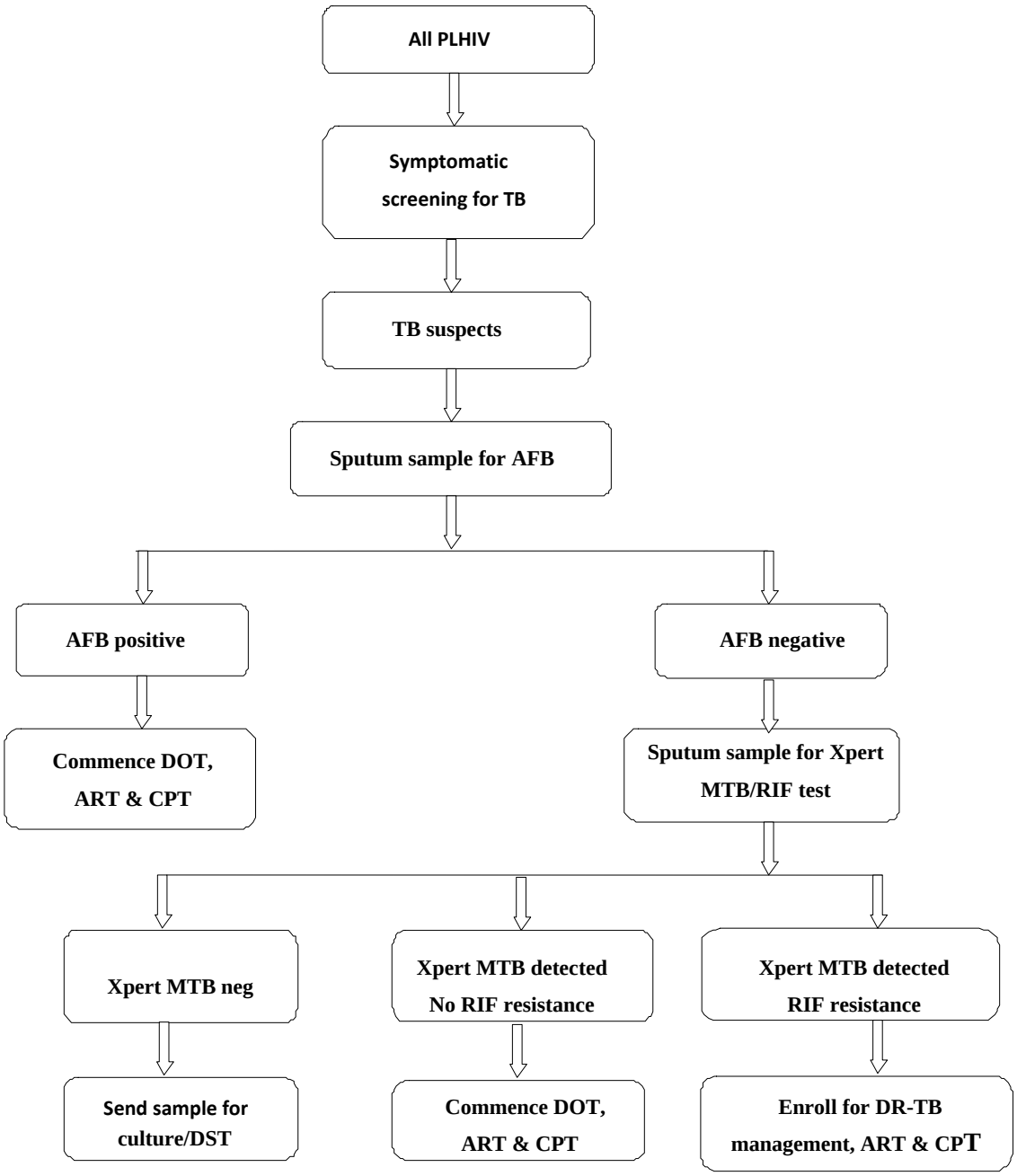

Fig. 2 Diagnostic algorithm for the Xpert MTB/RIF for presumptive TB among PLHIV.

services while 2 are at secondary health facilities with only DOTS services.

2.2 Study Design

The study design consists of a retrospective review of routine Xpert MTB/RIF data submitted quarterly to the National TB and Leprosy Control Program. Data was obtained from all the 15 sites where Xpert MTB/RIF was installed. But at the onset, 9 machines were procured and 7 of these were installed in Quarter 3, 2011. As at quarter 4, only the seven sites that were functional reported data. Thereafter, additional 6 Xpert MTB/RIF machines were procured and installed.

2.3 Data Collection Method

Based on the National Algorithms, recording and reporting tools were developed, printed and deployed to sites implementing the Xpert. The TB sputum

request form was reviewed to provide areas for Xpert request and reasons for request. Specific Xpert laboratory registers were developed in quarterly summary forms. The quarterly summary forms include indicators like, total number tested, proportion that are PLHIV smear negative, DR-TB suspects, their HIV status and the outcome of the test (MTB detected-no RIF resistance, MTB detected with RIF resistance detected and MTB not detected).

2.4 Data Analysis

From the data, simple descriptive statistics were obtained, and proportions were calculated from the absolute number of patients that accessed a particular service. No children were included in the study.

2.5 Ethical Approval

The study was essentially a desk review without any contact with human subject whatsoever. Data analysis was from national summary reports and as such ethical approval was obtained from the national TB program.

3. Results

For the 5 quarters period (Quarter 4, 2011-Quarter 4, 2012) for which data was obtained, a total of 3,725 sputa were tested with Xpert MTB/RIF. Of these, 1,195 (32.1%) were MTB positive and 463 (12.4%) sputa samples were obtained from PLHIV AFB smear negative suspects. However, 152 (4.0%) samples recorded error results. The distribution of samples, according to Xpert MTB/RIF sites in the country, is presented in Fig. 3.

Analysis of the result by sites indicated that NTBLTC (Tuberculosis and Leprosy Training Center), Abakaliki, NIMR (Nigerian Institute of Medical Research) and GCH (General Central Hospital), Jericho accounted for the bulk of sputa samples (62.8%). Further disaggregation of the results by gender indicated that 54.7% of the samples tested were males. Equally more males (65.3%) than females (34.7%) suspects tested MTB positive (Fig. 4).

Total RIF cases among those suspects tested was 353; and more males (64.0%) than females (35.9%) were RIF positives. The results of PLHIV sputa samples tested were presented in Fig. 5. Of which 357 (77.0%) were MTB negative, while 78 (17.0%) were MTB positive and 28 (6.0%) had error results. This result indicated an additional diagnostic yield of 17.0% over AFB test. Additionally, 5 (6.4%) PLHIV patients, who were positive with MTB, were also diagnosed to be rifampicin resistant.

The distribution of TB/HIV co-infected with rifampicin resistance in the study according to the location of test is presented in Table 1.

4. Discussion

The result shows very low utilization of the Xpert MTB/RIF for TB diagnosis among PLHIV (12.4%) despite the fact that 80% of the machines were located in facilities providing TB/HIV services. The possible factors identified were: the initial algorithm was only for Category 2 TB patients who failed treatment. Secondly, all the sites commenced using the new algorithm for PLHIV in June 2012, a situation which suggests a low awareness and capacity among clinicians at the ART clinics to use the algorithm. Equally there were challenges with samples or patients' referral to the Xpert MTB/RIF sites; low symptomatic TB screening of TB among PLHIV during subsequent visit and documentation. Most of these factors were identified and summarized by Piatek et al. [8]. The identified issues were grouped under operational, programmatic and technical requirements [8].

The study also shows an increased diagnostic yield of 17.0% TB cases over smear AFB microscopy tests. This result is consistent with other studies [4, 5, 9]. In a similar study by Theron et al. [10], the results demonstrated over 18% relative increase in TB case detection among PLHIV who were smear negative. The study further demonstrated high sensitivity of Xpert MTB/RIF over smear microscopy in persons infected with HIV or non-infected. The conclusion was

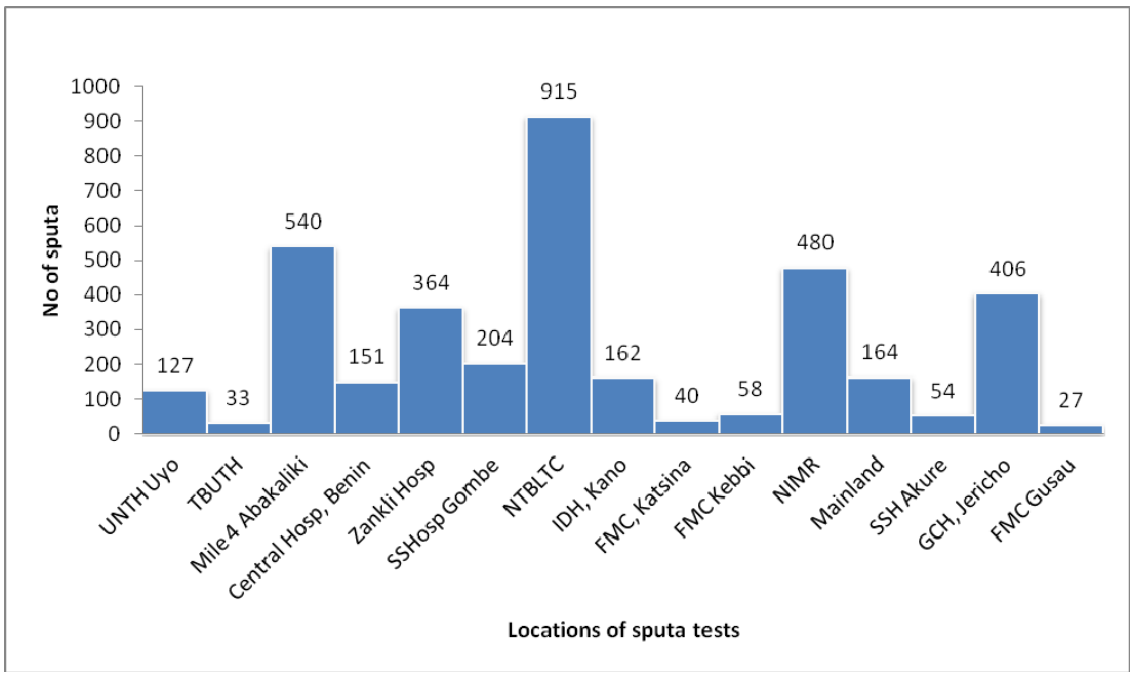

Fig. 3 Total sputa tested in the States.

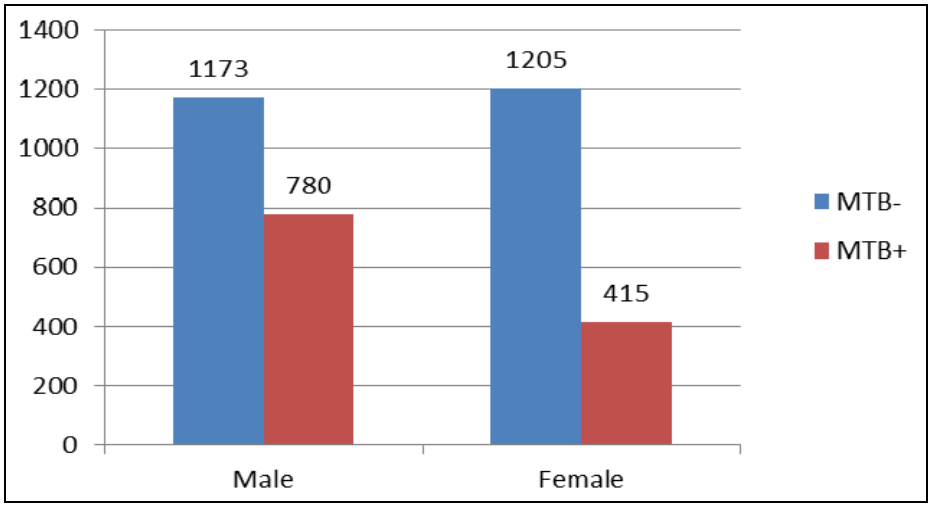

Fig. 4 Results of Gene Xpert Test in 15 locations by gender.

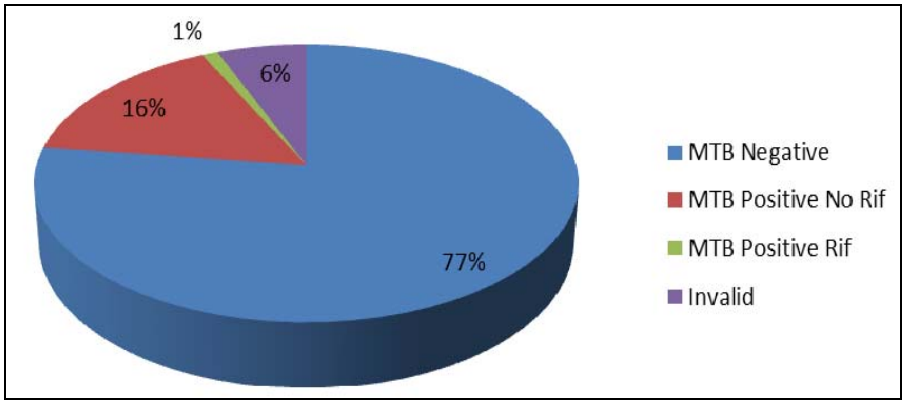

Fig. 5 Sputa test result of PLHIV smear negative suspects using Gene Xpert.

Table 1 Distribution of RIF in PLHIV suspects.

Period of test	Location	Number of RIF	Gender
Q3 2012	Kaduna	1	Female
Q4 2012	Kaduna	1	Female
Q4 2012	Ondo	1	Male
Q4 2012	FCT	2	Male

to combine both smear microscopy and Xpert MTB/RIF, which was not the case in Nigeria with the initial algorithm. The algorithm was subsequently reviewed to include all presumptive TB cases among PLHIV to be screened using Xpert.

Although Nigeria is rated as a high HIV prevalence country, very few of the AFB smear negative patients currently have access to Xpert MTB/RIF test, suggesting that the yield could be more if more HIV patients could have access to the diagnosis. Considering that 5 (6.4%) of the PLHIV were found to be resistant for rifampicin calls for active case finding given the fatality that MDR with rifampicin resistance could pose to the already poor state of TB epidemic in the country.

The study also noted gender disparity in the proportion of MTB positives and RIF resistant cases. More male cases were found in both instances to be higher than their female counterparts, which could imply a higher level of adherence to treatment among females than males. However, this needs further investigations.

5. Study Limitations

The limitation of the study was the phase implementation of the Xpert MTB/RIF with data among PLHIV available for only 2 quarters. However, the country revised the Xpert algorithm to include all presumptive TB cases among PLHIV irrespective of their smear results to have access to Gene Xpert test. The study also did not take into consideration or compare with other diagnostic tools such as culture, and Line Probe Assay (Hain). Other limitation of the study was the weak collaboration between TB and HIV service points especially on monitoring and evaluation, it was difficult to establish what proportion of PLHIV were actually symptomatically screened, how many were referred and what proportion were eligible for the Xpert MTB/RIF test, therefore the data presented here is only from the Xpert MTB/RIF laboratory register.

6. Conclusions

There appears to be an urgent need to extend and expand Xpert MTB/RIF services to all HIV services delivery points as well as to other states of the Federation to aid early diagnosis of TB in PLHIV patients and MTB rifampicin resistance cases. The opportunity of Xpert MTB/RIF should be used to strengthen TB/HIV collaboration especially at facility level. The two programs need to strengthen the logistics for sputum sample movement to the Xpert MTB/RIF laboratory.

Acknowledgments

The authors are grateful for USAID support and all the laboratory focal staff at facility levels who are tireless implementing the initiatives to ensure effective TB control in the states.

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Factors Undermining the Investigation of Child Contacts of TB Patients: The Case of FCT, Abuja, Nigeria

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Abstract: Facility records of 320 TB (tuberculosis) patients were examined over a one-year-period; January-December 2009 to ascertain the screening of children under 6 years of age who have had contacts with sputum smear positive TB patients as stipulated in the NTBLCP (National Tuberculosis and Leprosy Control Program) guidelines. In addition, semi-structured questionnaires were administered to 28 DOTS (directly-observed treatment strategy) clinicians to elicit information to help explain findings from the analysis of the routine data. Over 60% of children less than 6 years of age who had contacts with TB patients were not investigated in the health facilities included in the survey. The level of educational attainment of DOTS providers was associated with the screening of TB patients' contacts (P = 0.008). Forgetfulness by clinicians to ask for or screen children of TB patients in the facilities is the singular most important factor undermining contact investigation. The proportion of under 6 years TB contacts screened or not screened for TB in the facilities was similar according to the age and gender of TB patients, and the type of health facilities where treatment was accessed by patients (P = 0.325). The study underscored the need for the state program to evaluate the quality of service provision as well as counseling provided to TB patients at the facilities.

Key words: Contact investigation, children contact, tuberculosis, TB patients, case finding.

1. Introduction

TB (tuberculosis) is an infectious disease passing to people who live together in confined spaces or are in close contact with persons who have an infectious form of TB disease [1-3]. Through contact investigations, individuals with active TB and those with latent TB are identified for treatment [3]. Preventing TB among contacts of persons with TB disease and treatment of contacts with latent TB infection is a recognized strategy in the detection, control and elimination of TB. TB cases are most infectious when AFB (acid-fast bacilli) presents in sputum [4, 5]. Persons living in the household of a TB patient, therefore, have a high risk of becoming infected and developing tuberculosis themselves, particularly if their immune defenses are at all impaired [6]. The rate of having TB disease is 75 times higher among contacts than among the general population [7]. In studies, it has been established that infection of children serves as a measure of the burden of TB in adult population [8]. The reason for this is not unconnected to the fact that the progression of TB in children is quick in a short period of time [8]. Cases of latent or active tuberculosis infection in children are of great concern since it indicates that transmission of tuberculosis has occurred recently [1] or from an adult

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in close contact in the environment [8]. Children, particularly those less than 5 years of age, should be considered high priorities in any contact investigation since TB infection is more likely to progress to TB disease in younger children; the incubation or latency period is briefer; and lethal, more invasive forms of the disease are more common [9].

In 2011, Nigeria notified a total of 93,050 all forms of TB. Of these, children less than 15 years accounted for only 6% of total cases notified [10]. Of total new smear positive cases notified (47,436), children less than 15 years accounted for only 2%. The difficulties in diagnosing TB in children have been adduced as a possible reason for the low cases notification [11]. Efforts at diagnosis of TB in children have focused on other clinical presentations, such as chest radiograph and history of contact with an infectious case [11].

Passive case finding in countries with high prevalence of TB has not entirely been successful in the identification of number of persons with the disease [2]. Countries, such as Nigeria, in spite of efforts by WHO globally to control TB, have failed to attain the 70% case detection rate [3, 10]. However, contact investigation for cases of active pulmonary TB is standard practice in developed countries. Through this process, household and other close contacts of infectious case subjects are identified and tested for TB infection and disease [3]. This procedure for new case finding allows for early detection and treatment of a new infection, and early treatment of the disease. The WHO 2011 Guidelines on ICF (intensified case finding) and IPT (isoniazid preventive therapy) recommend that adults and adolescents who report any one of the symptoms of current cough, fever, weight loss, or night sweats be evaluated further for TB and other diseases. The same guidelines propose that children living with HIV who have any one of the symptoms of poor weight gain, fever, current cough, or contact history with a TB case should be evaluated further for TB and other conditions [12]. In spite of these and known fact of high risk of developing the disease among contacts of TB, and the possibility of curtailing transmission through active case finding [4, 13], contact investigation has remained a big challenge in Nigeria due to the shortage of human resource personnel and capacity of available personnel to deliver quality service to clients. This study was aimed at establishing key determinants of compliance of the GHCW (general health care workers) with the NTBLCP in evaluating the household contacts of TB patients diagnosed in the DOTS treatment sites. The specific objective of the study is to establish the factors hindering the non-investigation of under 6-year-old TB contacts in health facilities. The primary research question is what are the key factors hindering the non-investigation of under 6 years child contacts of TB patients.

2. Study Design and Method

The study is a retrospective study comprising a review of routine facility data of all forms of TB cases of TB patients enrolled between January and December 2009 on TB treatment in health facilities in FCT (Federal Capital Territory) Abuja. FCT has a total of 39 DOTS centers spread across 6 area councils; a listing of the area councils with the number of smear positive TB cases detected per site was obtained from the state TB program which served as the sampling frame. To obtain the facilities for the record review PPS (probability proportional to size), methodology was adopted in the selection of 10 facilities. Using the same PPS, 10 patients' records were selected in Abaji and Kuje; 52 in Bwari and Gwagwalada; 8 in Kwali and the bulk of record reviewed were from Abuja Municipal Area Council (188). At the site, patients' records were systematically selected to obtain the required quota for inclusion in the review. Index cases included in the survey are of sputum smear positive TB patients enrolled during the specified period aged 15 years and above who are on treatment. Patients' treatment cards meeting the above criteria in the facilities were reviewed. The patient's demographic background and smear results were obtained as well as the information

on under 6-year contacts of TB patients.

Additionally, 28 service providers in the DOTS sites selected for the study were sampled using a semi-structured interview guide. The guide was developed to elicit responses from the service providers on the demographic background of the service providers as well as efforts made by service providers to determine the onset of symptoms, examination of the sites of transmission, prioritization of the index patient's contacts. Other questions tried to elicit responses on the evaluation of the contacts as well as the treatment and follow up of contacts. In all, 2 providers were selected from tertiary; 8 from secondary and 10 from primary healthcare facilities. The data was coded and analyzed using Stata Version 10.

3. Results

320 records of TB patients were sampled in the study. Mean age of respondents is 31.9 ± 10.8 years. 54 (16.9%) had children less than 6 years of age with whom they had constant contacts. Only 19 (35.2%) of these children were screened for TB in the facilities, while very few (7.4%) were placed on Isoniazid (Table 1).

Chi-square test with Yates's continuity correction revealed that the proportion of < 6 years contacts screened for TB in the study was similar by age and gender of TB patients as well as type of health facility attended by TB patients ($P = 0.325$). However the odds of screening a TB contact under 6 years of age in a tertiary/secondary health facility is 0.6 (95% CI: 0.2, 1.9; $P = 0.394$) compared to a PHC (primary health care) in the study (Fig. 1). This point estimate indicates no association between the screening of TB contacts and type of health facility in the study.

4. Contact Investigation by Health Care Providers

Of the 28 DOTS providers in facilities included in the study, 13 (46%) indicated screening under 6 years contacts of TB patients while 15 (54%) did not. The analysis of DOTS healthcare providers' data as shown in Table 2 below indicates that the category, type and location of health facility had no influence on the screening of under 6 years TB contacts in health facilities. Female healthcare givers were least likely to screen under 6 years contacts compared to their male counterparts ($P = 0.01$). Additionally, healthcare workers with university/post graduate level of education were less likely to screen under 6 years TB contacts in the health facilities ($P = 0.008$).

Table 1 Background characteristics of TB patients.

Characteristics	*n* (%)
Gender	
Male	190 (59.4)
Female	130 (40.6)
Category of hospital patient attending	
Primary health care	161 (50.3)
Secondary or Tertiary	159 (49.7)
Patients having children < 6 years old	
Yes	54 (16.9)
No	266 (83.1)
Children screened for TB	
Yes	19 (35.2)
No	35 (64.8)
Children positive with TB	
Yes	2 (3.8)
No	52 (96.2)
Children on INH (isoniazid)	
Yes	4 (7.4)
No	50 (92.6)
Age of patients*	31.9 (10.8)

* Age is reported as mean (*S.D.*).

Reasons adduced for non-screening of under 6 years TB contacts by health providers in the facilities reveal that the most common reason for non screening of this category of TB contacts in the health facilities was identified to be forgetfulness to screen 17 (60.7%) on the part of care givers, followed by refusal of TB patients to bring their children for screening 4 (14.3%), non-availability of isoniazid 3 (10.7%).

Other reasons were that patients were too far and children could not produce sputum.

5. Discussion

The process of identifying, examining and evaluating all persons at risk of infection with mycobacterium

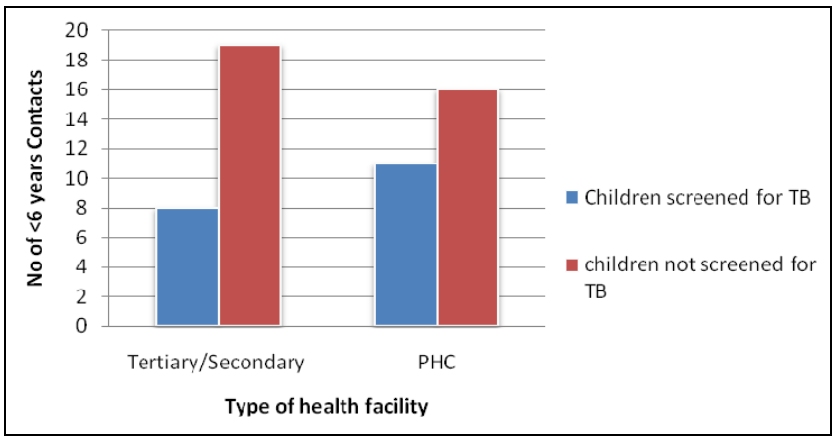

Fig. 1 Number of contacts screened at facilities.

Table 2 Characteristics of health facilities by DOTS health care personnel who did not screen under 6 years TB patients contacts.

Characteristics	Proportion of contacts not screened (%)	*P*
Category of facility		
PHC	6 (40.0)	0.464
Secondary/tertiary	9 (60.0)	
Type of facility		
Public	13 (86.7)	0.172
Private	2 (13.3)	
Location of facility		
Rural	3 (20.0)	0.062
Urban	12 (80.0)	
Gender of clinician		
Male	7 (46.7)	0.010
Female	8 (53.3)	
Level of education of clinician		
Diploma	4 (26.7)	0.008
University/post graduate	11 (73.3)	

tuberculosis due to recent exposure, allows for early detection and treatment of a new infection, and treatment of the disease [2]. Over 60% of children less than 6 years of age who had contacts with TB patients in the study were not investigated. This shows that health care providers in the study location may not be adhering to the TB guidelines for screening and early detection of mycobacterium tuberculosis. Additionally, the study revealed that health care providers in primary health care, though not significant were more likely to screen less than 6 years contact of TB patients compared to those in the secondary and tertiary facilities. Possible reasons for this may not be unconnected with the higher volume of patients who attend secondary and tertiary facilities which are usually based in urban locations. This may also be connected with the findings in the study which show that DOTS health care personnel with diploma certificates, who often are located in primary health care facilities in rural areas were more likely to screen under 6 years contact of TB patients than those with university and postgraduate degrees who are usually found in higher level of health care delivery systems in urban areas.

The study indicates, however, that forgetfulness by care givers was the most important reason for non screening of contacts. Methods such as the use of signage's at health care facilities and other job aides should be used to remind care givers of the need to investigate under age contacts when TB patients present at the facilities to assess care. The failure of health service providers to investigate contact is clearly a missed opportunity which can be effectively utilized in TB control efforts. Increased awareness of contact investigation among DOTS health care providers would be important in the drive to screen child contact of TB patients. The results indicate that the level of screening of children in tertiary and secondary health facilities is lower than in PHCs. This situation portends serious danger because these health facilities serve as referral points and should be positioned to lead in the

effort to stave the spread of TB in the country through early detection of TB in those who are exposed. Further studies may be required to confirm the low level of contact screening among healthcare providers with university or post graduate qualifications. The limitation of this study is that opportunities of latent TB in other contacts of TB patients which the present study did not investigate. The study may be limited by paucity of data from the health facility records; however, findings reveal that more efforts are required to increase child TB contact screening to prevent and effectively control the spread of TB in Nigeria.

6. Conclusions and Recommendations

Though the study from routine data indicates no association between age, gender and type of facility and the screening of under 6 years contacts, it is interesting that the level of educational attainment was an important factor in the screening of under 6 years TB contacts in the facilities. Majority of children under 6 years of age who have contacts with diagnosed TB patients receiving care at the DOTS facilities were not evaluated. The study underscores the need for the national and state programs to evaluate the quality of service provision as well as counseling provided to TB patients at the facilities. Innovative methods should be devised to prevent further spread of TB in households. The idea of an immediate screening or investigation of a contact should be implemented as soon as TB is diagnosed or strongly suspected in a patient, particularly when the contact is less than 6 years of age.

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Two-Dimensional pH Mapping of a Histamine-Stimulated Gastric Mucosa by Using an Ion Image Sensor in the Guinea Pig

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Abstract: In order to examine the hydronium ion (proton)-releasing functions in cells, $[pH]_{out}$ (extracellular pH) was measured using an ion image sensor composed of a 2D (two-dimensional) array of potential sensitive pixels. Using gastric tissues prepared from the stomach, pH distribution was observed during the histamine stimulation. The 2D distribution of $[pH]_{out}$ in the gastric tissues showed clear differences between the mucosal sides and the serous side. Even before the histamine stimulation, the mucosal side of the gastric mucosa showed a slightly lower pH than that of serous side. In the mucosal side, $[pH]_{out}$ decreased after the onset of the stimulation. The ion image sensor was capable of visualizing $[pH]_{out}$ in the gastric tissues. The present chemical-sensing technique realized a label-free microscopic assessment of the 2D distributions of biologically interesting substances, and consequently, $[pH]_{out}$ imaging via chemical microscopy has a future potential in medical fields for endoscopic analysis of gastric ulcers.

Key words: Proton, ion image sensor, extracellular pH, gastric acid secretion.

1. Introduction

1.1 Gastric Mucosa and Proton Release

In the stomach, a variety of substances including HCl (hydrochloric acid), mucus, and enzymes are secreted as a gastric juice [1]. Parietal cells in the stomach secrete HCl, reducing the pH of the juice to about 1.00, which is the optimal value to digest proteins. To assess the digestive function, several approaches were taken to examine the dynamic changes in the pH. The classic method involves the intermittent extraction of the gastric juice and titration to measure the total hydronium ion (proton, H^+) concentration [2]. Another method uses a pH electrode to measure the pH [3]. Forcibly inserting an electrode into the stomach allows the pH level to be continuously monitored inside the body. A fine type of electrode with a tip diameter less than 200 nm has been shown to successfully monitor the proton concentration at the lumen of a gastric gland without a labeling process [4].

On the other hand, secretion of the proton has been examined using several types of probes in isolated gastric glands. For example, using [^{14}C]-aminopyrine, the accumulation of hydronium ions by isolated canine parietal cells has been measured, and the kinetics of secretion was elucidated at the single cell level [5]. To visualize the proton concentration 2-dimensionally, pH-sensitive fluorescent probes were used under the microscope. Thereby the proton dynamics in the lumen were reported [6]. However, the same technique is not successfully applied to the regions near the gastric pit and its outside, probably because the gastric juice

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flushes the fluorescent probe away before it senses the protons in the juice. This labeling method is inadequate for real-time 2D (two-dimensional) imaging of the $[pH]_{out}$ (extracellular pH) value.

1.2 Development of an Ion Image Sensor for Label-Free Microimaging of $[pH]_{out}$

Using a silicon nitride deposition technique, a chemical sensor with 32 × 32 pixels was developed [7, 8]. It produced an electrical output in proportion to the surface potential on each pixel. Consequently, the pH of the solution was displayed with a high spatial resolution (~ 100 μm) in a wide field of view (3.75 × 3.75 mm^2). By a chemical sensing technique, 2D real-time imaging of not only $[pH]_{out}$ [9] but also the release of neurotransmitters would be possible in living cells without labeling [10]. This label-free technique to measure $[pH]_{out}$ would be useful to evaluate the activity of acid secreting cells in the gastric tissues. Here, the histamine-induced $[pH]_{out}$ responses observed using the ion image sensor technique would be demonstrated in the mucosal side of the gastric tissue.

2. Materials and Methods

2.1 Ion Image Sensor

An ion image sensor made of the CMOS (complementary metal oxide semiconductor) aligned in a 32 × 32 pixel array was used. The sensor measured 3.75 × 3.75 mm^2 and was equipped with a solution chamber (Fig. 1). The sensor consisted of several elements: an ID (input diode), ICG (input control gate), ion-sensing region, TG (transfer gate), FD (floating diffusion) region, and RES (reset switch). To initiate the FD potential, the RES was opened, and the electric charge was injected into the Si potential well by briefly pulsing the ID from VID1 to VID2. To store the charge in the potential well, the ID was then maintained at VID1. Afterwards, the TG was opened, and the charge packet was transferred to the FD. The potential of the FD was read as the output signal.

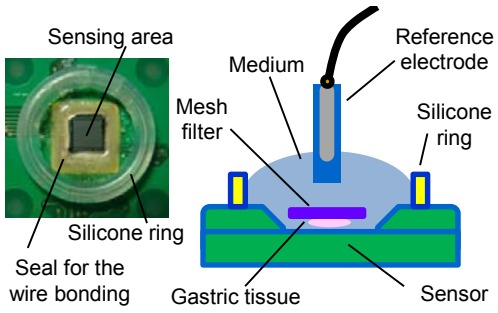

Fig. 1 Configuration to hold the specimen on the sensor. (a): Photograph of the sensor chip (32 × 32 pixels) with a silicone ring attached. (b): Configuration of the electrode and specimen on the sensor chip.

2.2 Recording of the pH in Solution

The pH was recorded in solution with or without gastric tissues. Before each measurement, the sensor chamber was rinsed twice with deionized water. A AgCl mono-electrode, which served as the reference, was placed in the standard medium (40-100 μL), which was modified from Berglindh's and Holton's methods [11, 12]. The composition of the medium (in mM) was: NaCl, 133.5; KCl, 5; $CaCl_2$, 1.0; $MgSO_4$, 1.2; D-glucose, 11.1; HEPES, 0.5 (pH = 7.4 adjusted with NaOH). The pH values of all the pixels were measured, and then the sample solution was added to examine its effect.

2.3 Chemicals

NaCl, KCl, and $CaCl_2$ were obtained from Wako Pure Chemical Industries, Ltd. (Osaka, Japan). HEPES was purchased from Dojindo Laboratories (Kumamoto, Japan). D-glucose, histamine and CCh (carbachol) were obtained from Sigma-Aldrich (St. Louis, USA).

2.4 Animals

The subjects were male guinea pigs (Hartley strain, four-weeks old, 250-300 g) that fasted for 18-20 h, and male rat (Wister strain, 2 days old, 5-10 g in weight). The animal experiments were approved by the Animal Experiment Committee at Hamamatsu University School of Medicine and Toyohashi University of Technology.

2.5 Preparation of the Gastric Tissues

The guinea pig was anaesthetized via diethyl ether inhalation, and the stomach was removed. Then the gastric corpus was excised. The mucosal tissue was removed from the muscular layer by scraping with the edge of glass plate. Lastly the tissue was cut into 1-2 mm pieces, and then stored in the medium at 4 °C until use.

2.6 Preparation of Hippocampal Slices

The hippocampal slice was excised from the brain of neonatal rat anesthetized according to the method previously described [13]. Each slice was approximately 400 μm thick and measured approximately 1 × 2 mm^2. The slice was placed on a Millicell CM (PTFE-membrane, Millipore, Tokyo, Japan) containing dish, and subsequently cultured for four days at 37 °C with 5% CO_2 in air in a humidified incubator. The cultured slice was carefully placed upside down on the image sensor, and superfused with the standard medium.

2.7 Sample Setting and Histamine Stimulation

As a part of the solution chamber, a silicone ring was attached to prevent the medium from overflowing during measurements with a sensor (Fig. 1a). The gastric tissue was placed on the sensor and then covered with a mesh filter to prevent the tissue from moving upon adding the stimulant solution. A reference electrode was immersed into the medium. Fig. 1b shows the specimen configuration. The excised tissue was placed on the sensor in one of several configurations as describe and thoroughly superfused with the medium. As a control, the $[pH]_{out}$ value at the border between the sensor and the tissue was monitored in a non-stimulated sample, and then histamine (or histamine + CCh) was added to induce a response. After recording $[pH]_{out}$ without stimulation for about one minute, the stimulant was added to the solution (final conc. 1 mM histamine, or 1 mM histamine + 100 μM CCh) with the goal of stimulating the histamine-sensitive cells of the gastric mucosa.

3. Results and Analysis

3.1 pH Changes in the Solution

The ion image sensor was used to monitor the pH distribution in the medium (Fig. 2). The color spectrum represents the pH; a low pH is red, while a high pH is blue. In this case, the pH range varied from 3 to 9 (Fig. 2a-2d). When the medium was first placed on the sensor, the pH image was uniform in the sensor field with an average value of 7.3 ± 0.1 (Fig. 2a). The degree of the fluctuation was estimated to be the noise level of the present sensor. The pH was changed immediately after adding the HCl solution (Fig. 2b). An acidic pH was initially observed at the site where HCl was added. About 60 s later after adding the HCl, diffusion caused the entire field to become uniform, and the pH distribution showed a stable value until the measurement end at 300 s (Fig. 2d). The lowest pH value appeared 1 s after adding HCl at the indicated area (e) in Fig. 2b. Fig. 2e plots the pH change at location (e) (shown in Fig. 2b) with time. Changes in acidic pH were insignificant upon adding the histamine solution, which was prepared as a buffer solution (data not shown). The present sensor was sensitive to HCl, demonstrating its ability to detect an acidic pH change.

3.2 $[pH]_{out}$ Distribution in the Gastric Glands

Fig. 3 shows images of $[pH]_{out}$ for different placements of the gastric tissue on the sensor in a 3.75 × 3.75 mm^2 field of view. Figs. 3a, 3f and 3k show the mucosal side down, serous side down, and sideways configuration, respectively. The pH value was slightly lower in the corresponding area when the images of the slices were observed by bright field microscopy. The average pH value was 6.2 for the mucosal side (Fig. 3b) and 6.6 for the serous side (Fig. 3g), which were slightly lower than the value of the medium. The pH of the mucosal side was moderately lower than that of the serous side. On the other hand, the pH value of the hippocampal slice (1 × 2 mm^2) showed a uniform pH in

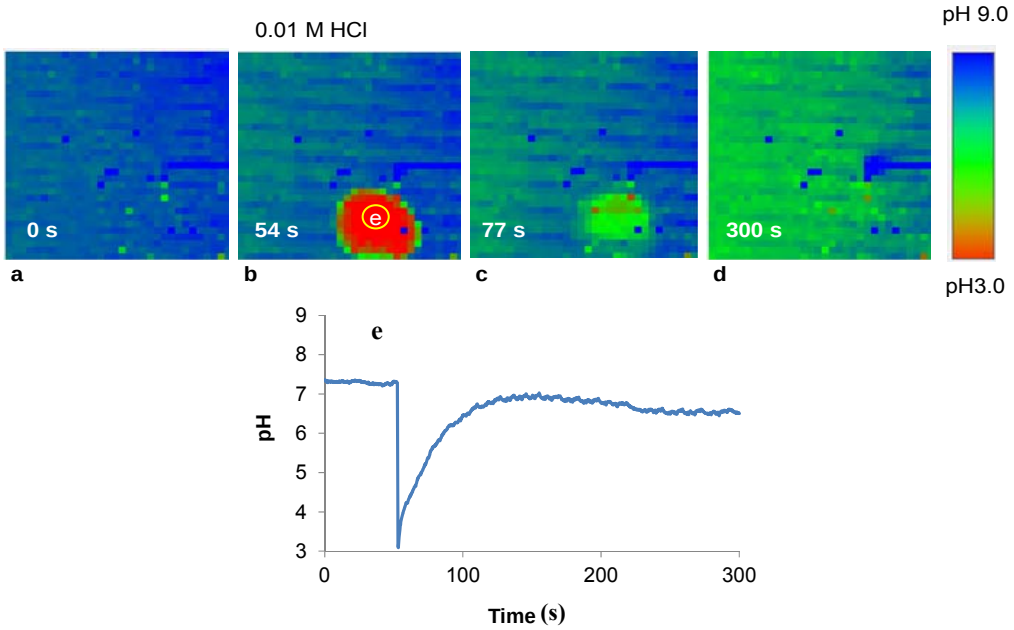

Fig. 2 2D pH distribution change upon application of an aliquot of a 0.01 M HCl solution into the medium. (a): Initial 2D pH distribution of the medium (70 µL). (b)-(d): 2D pH image change observed after adding a 0.01 M HCl solution (1 µL) without stirring. (e): Time course of the pH change in the location e (yellow circle in Fig. 2b).

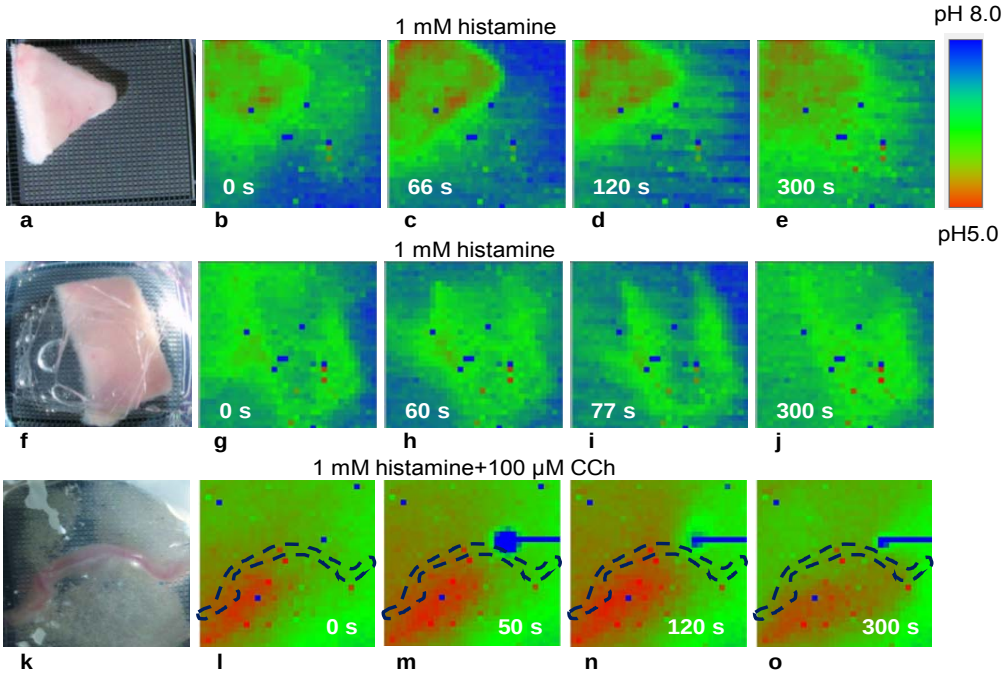

Fig. 3 pH distribution depending on the serosal-mucosal orientation of the gastric mucosa. (a): Photograph of the gastric tissue. The mucosal side of the gastric tissue was placed on the sensor. (b): 2D pH distribution of the gastric tissue in Fig. 3a. (c)-(e): Changes in 2D pH image after 1 mM histamine stimulation. (f): Photograph of the gastric tissue. The serosal side of the gastric tissue was placed on the sensor. (g): 2D pH distribution of the gastric tissue in Fig. 3f. (h)-(j): Changes in 2D pH image after 1 mM histamine stimulation. (k): Photograph of the gastric tissue. Cross-section of the gastric tissue was placed on the sensor. A piece of white sponge was placed outside the tissue to prevent the tissue from moving during the stimulation. (l): 2D pH map of the gastric tissue shown in Fig. 3k. (l)-(o): Changes in 2D pH image after 1 mM histamine + 100 µM carbachol (CCh) stimulation. Dashed line in dark blue shows the area of the tissue, and the line in dark blue in the Figs. 3m-3o represents the failed pixels. The pH range varied from 5 (red) to 8 (blue).

any area of the slice. Moreover the degree of the pH shift was lower than the noise-derived fluctuation for a 180 s recording in the tissue prepared from brain (Fig. 4).

3.3 Histamine-Induced pH Changes in the Mucosal Side of the Gastric Glands

The sensor was used to examine the histamine-induced response in the tissues. Unlike the control experiments, the $[pH]_{out}$ changes were observed in part of the view immediately after stimulation with 1 mM histamine. Histamine stimulation induced proton release from the excised tissue, and the value of $[pH]_{out}$ decreased over time (Figs. 3c-3e, 3h-3j, and 3m-3o). Fig. 5 shows the pH changes with time. At the gastric tissue, the degree of the $[pH]_{out}$ changes due to histamine stimulation was approximately 0.2 (Fig. 5b). On the other hand, the spatial pattern differed from the configuration pattern of the tissue; that is, after histamine stimulation, the slightly lower 2D pH distribution from the tissue area to the outside indicated

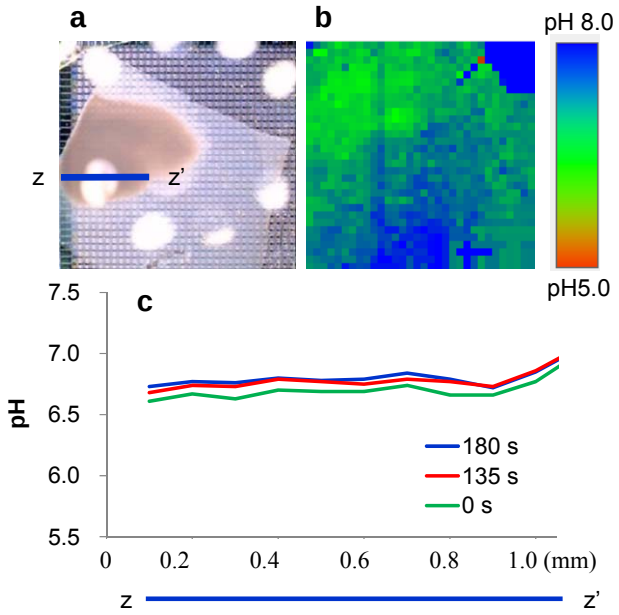

Fig. 4 pH Profile of the hippocampal slice. (a): Photograph of the hippocampal slice covered with Millicell CM. White circles were reflected light from the illumination. (b): 2D image of the slice at 0 s in Fig. 4a. (c): pH profile of the hippocampal slice along the z-z' (blue) line in Fig. 4a.

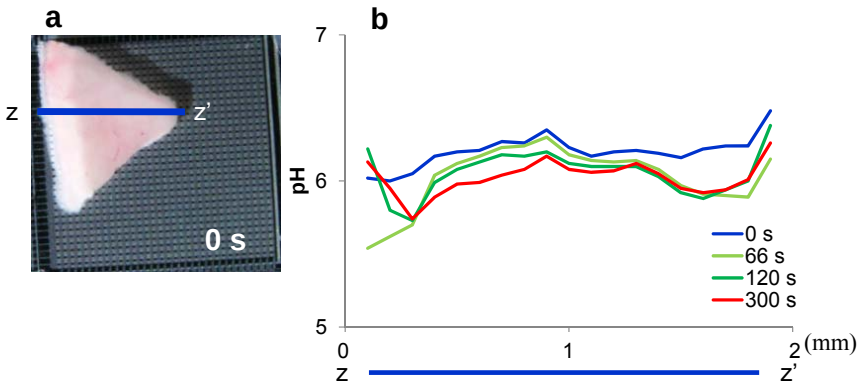

Fig. 5 2D analysis of the pH change during the histamine stimulation. (a): Photograph of the gastric tissue. The blue line indicates where the pH profiles were acquired for the graph in 5b. (b): pH profile of the gastric tissue along the z-z' line in Fig. 5a. Measurements were acquired at 0, 66, 120, and 300 s. Histamine stimulation was conducted at 60 s.

secretion (Figs. 3c and 3e). Mostly, the acidic pH response in the mucosal side was larger than that in the serous side of the gastric cells (Figs. 3b-3e and 3g-3j). These results indicate that the decrease in $[pH]_{out}$ reflects active release of protons from acid-secreting cells.

4. Discussion

In the case of pH measurement, the conventional pH electrode is useful for monitoring the pH value of the solution, except for aiming to examine the 2D map over time. The development of an array of proton-detectable sensor enabled us to visualize the 2D dynamic changes in pH of the sensing surface where the samples were placed [8]. Hence, the ion image sensor was used for 2D real-time mapping of pH in the gastric mucosa excised from guinea pig stomach.

Real-time monitoring of $[pH]_{out}$ using an ion image sensor (32 × 32 pixels) successfully demonstrated the dynamics of gastric mucosa, which contained proton-releasable parietal cells, from various sides. First, pH monitoring with HCl confirms the sensor's sensitivity to protons; the decrease in pH depends on the HCl concentration. An acidic shift occurs immediately after adding HCl. Consistently with the previously calculated theoretical value, the pH detection limit is 0.1 [14]. These results indicate that the present image sensor is sufficiently sensitive to pH changes, and should be suitable to analyze proton release at the gastric pit.

Second, the sensor measured $[pH]_{out}$ in excised gastric tissues. $[pH]_{out}$ beneath the tissue is lower than the set value of the standard medium. Comparing the results with those of the brain slice in the resting condition shows that the degree of the acidic shift in the gastric tissue is higher than that in the brain slice. The acidic shift indicates that the activity of proton release mainly involves constitutive secretion of mucus. Actually, the total amount of the acidic region in the mucosal side is larger than that of the serous side. The present ion image sensor has the potential for 2D assessments of proton-related cellular activity, even in the non-stimulated tissues.

Third, the sensor detected the acidic shift of $[pH]_{out}$ in histamine-stimulated tissues for the mucosal side, but not the serous side. Thus, the acidic shift of the pH reflects proton secretion from the histamine-sensitive cells, plausibly from the parietal cells. Setting the chemical sensor beneath an excised tissue can detect proton-derived acidification, demonstrating that the proton concentration in the detectable zone between the sensor and mucous surface increases.

The 2D pH mapping with the ion image sensor described in this paper enables the assessment of pH distribution of the gastric mucosa and the analysis of the pH change for the gastric ulcer. In the case of gastric ulcer, mucosal damages occur by reducing a repair capability of the gastric mucosa. The gastric acid accelerates the inflammation. The present method might be useful for analyses of the kinetics of the acid or alkaline secretion and its spatiotemporal coordination.

5. Conclusions

It was demonstrated that the present chemical imaging system, based on an ion image sensor, can capture the 2D distribution of pH and histamine-induced proton release in non-labeled gastric tissues. This real-time live chemical imaging technique promises multi-dimensional analysis of the releasing activity and the conditions in the mucous layer, which will lead to low-invasive and dynamic diagnoses of the physiological functions and disorders in the gut.

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